



# 9<sup>TH</sup> EUROPEAN NONLINEAR DYNAMICS CONFERENCE

**25-30 June, 2017**

**Budapest, Hungary**

Department of Applied Mechanics  
Budapest University of Technology  
and Economics

## **PROGRAMME**

**[www.congressline.hu/enoc2017](http://www.congressline.hu/enoc2017)**

# ORGANIZERS

## **Local Organizing Committee (LOC)**

Gábor Stépán (*chairman*)

Gábor Csernák (*secretary*)

Péter Beda

Gábor Domokos

Zsolt Gáspár

János Józsa

György Károlyi

Gyula Patkó

Tamás Tél

János Vad

## **European Nonlinear Oscillations Conference Committee (ENOCC)**

Giuseppe Rega, Italy (*Chair ENOCC*)

Vincent Acary, France

Matthew Cartmell, UK

Felix Chernousko, Russia

Oded Gottlieb, Israel

Andrei Metrikine, The Netherlands

Remco Ingmar Leine, Germany

Pedro Leal Ribeiro, Portugal

Alois Steindl, Austria

Gábor Stépán, Hungary

# WELCOME

**Dear Colleagues,**

It is my great pleasure and privilege to welcome you at the 9<sup>th</sup> European Nonlinear Dynamics Conference (ENOC 2017) in Budapest, Hungary.

I would like to express my gratitude to the European Nonlinear Oscillations Conference Committee and Council for supporting our proposal. My colleagues in the Local Organizing Committee did their best to create a friendly atmosphere for work and rest, encourage new personal contacts and exchange of ideas.

Budapest is an ideal setting to discuss current progress in the research of nonlinear dynamics. Our capital is a city of outstanding geographical location with great traditions, wonderful historical places, as well as plenty of prestigious hotels within walking distance to the venue and to downtown Budapest.

According to the traditions of ENOC conferences, the scientific programme is structured to numerous minisymposia on major and challenging pre-defined topics, organized by well-recognized scientists.

I wish you all a successful meeting, full of exchange and improvement of ideas and knowledge in the diverse fields of nonlinear dynamics.

**Gábor Stépán**

Chair of ENOC 2017

*Department of Applied Mechanics*

*Budapest University of Technology and Economics*

# GENERAL INFORMATION

## **Conference date**

25-30 June, 2017

## **Conference venue**

Budapest University of Technology and Economics (BME)  
H-1111 Budapest, Műegyetem rkp. 3. / Building K

Please note that the plenary room (KF51, Auditorium Maximum), session rooms, Aula and Gallery areas are on 3 different levels in the building, they are visualized on the floorplans in this programme book.

## **Access by public transportation**

The simplest way to reach the venue of ENOC 2017 - Building K of BME - is by a short walk from the public transport interchange hub called Szent Gellért Tér (St. Gellért Square).

Trams stopping here: 19, 41, 47, 48, 49, 56, 56A

Busses stopping here: 7, 133E

Underground line No. 4 (Metro M4, green line)

## **Official conference language**

The official language of the conference is English.

## **Internet access**

Password secured free WIFI is available at the venue of the conference.

For access codes please contact the registration desk on-site.

## **Registration and information desk opening hours**

25 June, Sunday 15.00- 21.00

26 June, Monday 8.00-18.00

27 June, Tuesday 8.00-18.00

28 June, Wednesday 8.00-14.00

29 June, Thursday 8.00-18.00

30 June, Friday 8.00-12.00

## **Hotline to registration desk**

+36 70/608-6806

## **Meals**

Included in the registration fee, organisers provide coffee breaks and hot lunches for the participants. The meals are served in the Aula and on the Gallery of the conference venue where the registration desk and the poster stands are placed.

The serving points are marked on the floorplan in this program book, the serving times are detailed in the programme overview.

## **Badges**

Identification badges are provided along with other conference materials upon registration. The organisers kindly ask you to wear them all the time during the conference. Please also note that your conference badge assures your entrance to conference premises and catering. Persons without badges may be refused.

The identification badges are also helpful when contacting the secretariat and other participants.

## **Mobile phones**

Please respect the speakers and presenters by ensuring that your mobile phone is switched off during the scientific sessions.

## **Technical Information for Speakers**

The organizers kindly ask you to bring your presentations with you on a USB memory stick. Your presentation must be uploaded to the computers in the posted room with the help of the assisting volunteers responsible for the dedicated room.

The presentation uploading deadline is the last coffee break prior to your scheduled presentation. Please note that double slide projection and personal laptops cannot be used.

## **Technical Information for Poster Presenters**

Poster size: 1189 mm vertically x 841 mm horizontally (A0 portrait size)

Poster set-up: Monday, 26 June from 9.00

Poster removal: Friday, 30 June from 11.00

All supplies needed to hang the posters will be available at the poster stands.

Poster session: **Thursday, 29 June 16.00-18.00**

## **Programme changes**

Due to unforeseen circumstances the organisers cannot assume liability for any changes in the scientific programme. Organisers will do their best to keep ENOC 2017 participants up to date, possible changes in programme will be immediately communicated.

## **Conference papers of ENOC 2017 Conference**

Please find all the papers under the following link:

**<http://congressline.hu/enoc2017/abstracts.php>**

## ENOC 2017 Young Scientist Award

The Organizing Committee proudly announces the ENOC 2017 Young Scientist Award given for the best two oral presentations during the conference.

The nominated presentations will be evaluated during the sessions and awarded on the Closing Ceremony. Each winner will receive a 300 EUR prize, a special experimental device and a certificate.

## ENOC 2017 Best Poster Award

The Organizing Committee proudly announces the ENOC 2017 Best Poster Award given for the best poster presentation during the conference. The best poster will be chosen during the poster session and awarded on the Closing Ceremony.

The winner will receive a special experimental device and a certificate.

## REGISTRATION FEES

Registration types	Regular fees after 28 April, 2017	Onsite fees
Participant/Author registration fee EUROMECH member	EUR 550	EUR 570
Participant/Author registration fee non EUROMECH member	EUR 580	EUR 600
Student/Student Author registration fee	EUR 300	EUR 300
Additional paper handling fee	EUR 100	EUR 100
Accompanying Person participation fee	EUR 180	EUR 180

All prices include 27% VAT.

### Participant / Author / Student fees include

- Access to all conference sessions
- Conference bag
- Programme booklet
- Attendance at the Ice Breaker
- Attendance at the half day excursion
- Attendance at the Farewell Dinner
- Coffee and tea during coffee breaks
- Lunches

### The accompanying person fee includes

- Attendance at the Ice Breaker
- Attendance at the half day excursion
- Attendance at the Farewell Dinner
- Castle tour including visit at the National Gallery
- Budapest Bath Tour – Széchenyi Bath
- Tour bag

## SOCIAL PROGRAMMES

### Ice Breaker

Sunday, 25 June, 2017, 19.00-21.00

Venue: Budapest University of Technology and Economics, Building K, Aula

Included in registration fee / accompanying fee

By refreshing yourself after travelling with some wine and snacks, you can register and meet your colleagues at the conference venue.

### Farewell Dinner

Thursday, 29 June, 2017, 19.00-24.00

Venue: Szekér Csárda / Budapest, Óbuda Island

Included in registration / accompanying fee

Departure: by boat at 19.00 from Gellért Square port Liberty Bridge (Szabadság híd) Buda side.

The organizers of the ENOC 2017 congress are willing to give you a little taste of the Hungarian culture spiced with a memorable boat trip on the river Danube. Make sure not to miss this unique opportunity and attend the farewell dinner! Beyond the pleasant boat ride you will get excellent Hungarian hospitality, traditional food, nice wines, lots of fun with colleagues and a temporary time travel back to the 19<sup>th</sup> century to see how Csárdás was danced in a Csárda.

### Half day excursion (prior registration was needed)

Wednesday, 28 June, 2017, 13.30-18.00

Included in registration fee / accompanying fee

Departure: at 14.00 from Budapest University of Technology and Economics

**Please note that for security reasons a photo ID is necessary, make sure to have it with you!** During the excursions refreshments are provided.

#### *Sightseeing tour*

This half-day sightseeing tour highlights the most attractive features of the beautiful city of Budapest. Participants also visit the impressive House of Parliament.

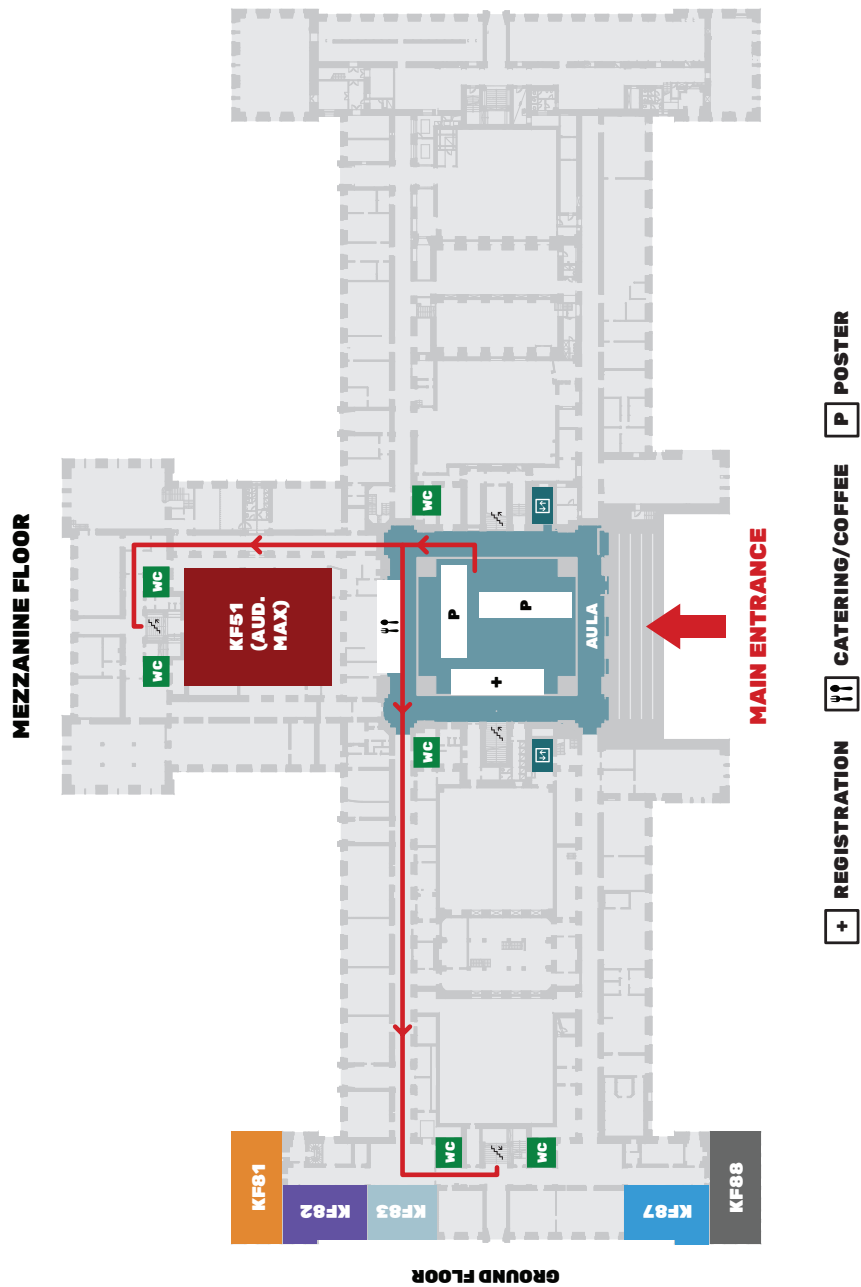
#### *The Jewish sights of Budapest*

During this four-hour long walking tour in the world's second largest Synagogue you can have an inside look into the Jewish quarter's very rich history.

#### *Factory visit AUDI Hungary*

AUDI Hungary invites you to a stunning factory tour on the path. Please calculate with 1,5 hours bus transportations to the visitor centre and back.

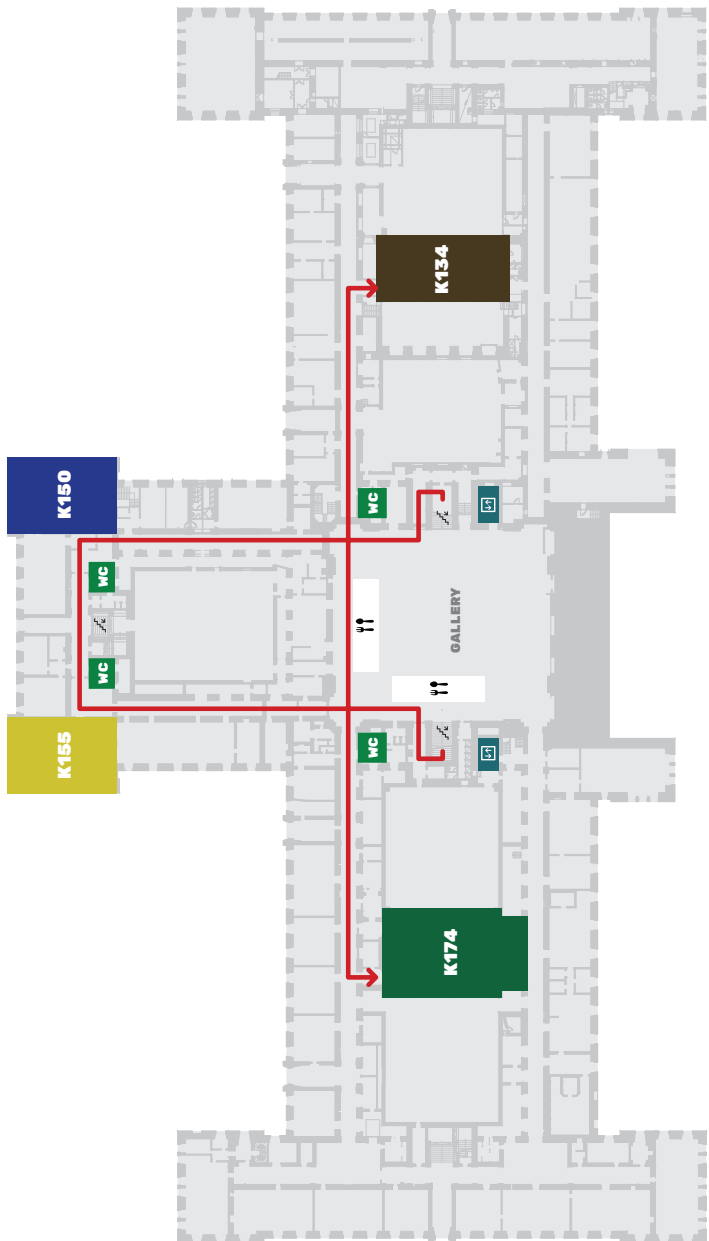
# FLOORPLANS





# FLOORPLANS

## FIRST FLOOR



 CATERING/COFFEE

# PROGRAMME OVERVIEW

## Sunday, 25 June, 2017

19.00 - 21.00 ICE BREAKER – AULA, BUDAPEST UNIVERSITY OF TECHNOLOGY AND ECONOMICS

## Monday, June 26, 2017

TIME/ ROOM	ROOM 1 (KF51)	ROOM 2 (K174)	ROOM 3 (K155)	ROOM 4 (K134)	ROOM 5 (K150)	ROOM 6 (KF81)	ROOM 7 (KF88)	ROOM 8 (KF82)	ROOM 9 (KF87)
09.30	Opening Ceremony								
- 10.30	COFFEE BREAK								
10.30									
- 11.00									
11.00	<b>Particles - Simulating Complicated Processes with Meshfree Methods</b> Peter Eberhard <i>University of Stuttgart, Germany</i>								
- 12.00									
12.00									
- 13.30	LUNCH								
13.30	MS-09 I. Nonlin. Dyn. Eng. Sys.	MS-11 I. Time delay	MS-03 I. Comput. M.	MS-08 I. Nonlin. Mech. & Struct.	MS-18 I. Control	MS-10 I. Non-smooth Dyn.	MS-07 I. Multibody	MS-19 I. Fluid- Structure	MS-06 I. Fractional Deriv.
- 15.30	COFFEE BREAK								
- 16.00									
16.00	MS-09 II. Nonlin. Dyn. Eng. Sys.	MS-11 II. Time delay	MS-03 II. Comput. M.	MS-08 II. Nonlin. Mech. & Struct.	MS-18 II. Control	MS-10 II. Non-smooth Dyn.	MS-07 II. Multibody	MS-19 II. Fluid- Structure	MS-06 II. Fractional Deriv.
- 18.00									

Tuesday, June 27, 2017

TIME/ ROOM	ROOM 1 (KF51)	ROOM 2 (K174)	ROOM 3 (K155)	ROOM 4 (K134)	ROOM 5 (K150)	ROOM 6 (KF81)	ROOM 7 (KF88)	ROOM 8 (KF82)	ROOM 9 (KF87)
09.30	MS-09 III. Nonlin. Dyn. Eng. Sys.	MS-11 III. Time delay	MS-03 III. Comput. M.	MS-08 III. Nonlin. Mech. & Struct.	MS-18 III. Control	MS-10 III. Non-smooth Dyn.	MS-07 III. Multibody	MS-02 I. Asymptotic M.	MS-01 I. Reduced- order
-									
10.30									
10.30	COFFEE BREAK								
-									
11.00									
-	<b>Autonomous assembly of a team of flexible spacecraft</b>								
11.00	Plenary lecture								
12.00									
-									
13.30									
13.30	MS-09 IV. Nonlin. Dyn. Eng. Sys.	MS-11 IV. Time delay	MS-03 IV. Comput. M.	MS-08 IV. Nonlin. Mech. & Struct.	MS-18 IV. Control	MS-10 IV. Non-smooth Dyn.	MS-13 I. Nonlin. Dyn. in Biol.	MS-02 II. Asymptotic M.	MS-01 II. Reduced- order
-									
15.30									
-	COFFEE BREAK								
16.00									
-	MS-09 V. Nonlin. Dyn. Eng. Sys.	MS-11 V. Time delay	MS-03 V. Comput. M.	MS-08 V. Nonlin. Mech. & Struct.	MS-18 V. Control	MS-16 I. Random Dyn. Sys.	MS-13 II. Nonlin. Dyn. in Biol.	MS-02 III. Asymptotic M.	MS-01 III. Reduced- order
18.00									

Wednesday, June 28, 2017

TIME/ ROOM	ROOM 1 (KF51)	ROOM 2 (K174)	ROOM 3 (K155)	ROOM 4 (K134)	ROOM 5 (K150)	ROOM 6 (KF81)	ROOM 7 (KF88)	ROOM 8 (KF82)	ROOM 9 (KF87)
09.30	MS-09 VI. Nonlin. Dyn. Eng. Sys.	MS-11 VI. Time delay	MS-12 I. MEMS-NEWS	MS-08 VI. Nonlin. Mech. & Struct.	MS-04 I. Experiments	MS-16 II. Random Dyn. Sys.	MS-14 I. Nonlin. Dyn. Eng. Design		MS-20 I. Wave Propagation
-									
10.30									
-									
11.00									
-									
12.00	Plenary lecture								
12.00									
-									
13.30									
14.00									
-									
18.00									

Internal resonances in tiny structures: new results and practical applications

Steven Shaw<sup>1,2</sup>  
<sup>1</sup>Department of Mechanical and Aerospace Engineering, Florida Institute of Technology, Melbourne, FL, USA  
<sup>2</sup>Departments of Mechanical Engineering and Physics and Astronomy, Michigan State University, East Lansing, MI, USA

Thursday, June 29, 2017

09.30	MS-21 I. Traffic & Vehicle	MS-12 II. MEMS-NEMS	MS-05 I. Slow-fast Sys.	MS-04 II. Experiments	MS-17 I. Time-periodic Sys.	MS-14 II. Nonlin. Dyn. Eng. Design	MS-15 I. Energy Transfer	MS-20 II. Wave Propagation
-								
10.30								
-								
11.00								
-								
12.00	Plenary lecture							

COFFEE BREAK

Tailoring nonlinearity for advanced engineering design: linearization, optimization and practical realization

Gaëtan Kerschen  
Space Structures and Systems Laboratory, Aerospace and Mechanical Engineering Department, University of Liege, Belgium

Tailoring nonlinearity for advanced engineering design: linearization, optimization and practical realization  
Gaëtan Kerschen  
Space Structures and Systems Laboratory, Aerospace and Mechanical Engineering Department, University of Liege, Belgium

Thursday, June 29, 2017

TIME/ ROOM	ROOM 1 (KF51)	ROOM 2 (K174)	ROOM 3 (K155)	ROOM 4 (K134)	ROOM 5 (K150)	ROOM 6 (KF81)	ROOM 7 (KF88)	ROOM 8 (KF82)	ROOM 9 (KF87)
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12.00  
- LUNCH  
13.30

13.30	-	MS-12 III. MEMS-NEMS	MS-05 II. Slow-fast Sys.	MS-04 III. Experiments	MS-17 II. Time-periodic Sys.	MS-14 III. Nonlin. Dyn. Eng. Design	MS-15 II. Energy Transfer	MS-21 II. Traffic & Vehicle
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15.30  
- COFFEE BREAK  
16.00

16.00  
- POSTER SESSION  
18.00

19.00 FAREWELL DINNER

Friday, June 30, 2017

09.30	-	MS-12 IV. MEMS-NEMS	MS-05 III. Slow-fast Sys.	MS-17 III. Time-periodic Sys.	MS-14 IV. Nonlin. Dyn. Eng. Design	MS-15 III. Energy Transfer
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10.30  
- COFFEE BREAK  
11.00

Exact model reduction for nonlinear oscillations: from equations to data sets  
George Haller  
Chair in Nonlinear Dynamics, Institute for Mechanical Systems, ETH Zürich

Plenary lecture

Closing ceremony

12.00  
-  
13.30

# LIST OF MINI-SYMPOSIA

<b>Nr.</b>	<b>Title</b>	<b>Short name</b>
MS01	Reduced-Order Modeling and System Identification	Reduced-order
MS02	Asymptotic Methods	Asymptotic M.
MS03	Computational Methods	Comput. M.
MS04	Experiments in Nonlinear Dynamics and Control	Experiments
MS05	Slow-Fast Systems and Phenomena	Slow-fast Sys.
MS06	Fractional Derivatives	Fractional Deriv.
MS07	Dynamics and Optimization of Multibody Systems	Multibody
MS08	Nonlinear Phenomena in Mechanical and Structural Systems	Nonlin. Mech. & Struct.
MS09	Nonlinear Dynamics in Engineering Systems	Nonlin. Dyn. Eng. Sys.
MS10	Non-Smooth Dynamics	Non-smooth Dyn.
MS11	Systems with Time Delay	Time delay
MS12	Micro- and Nano-Electro-Mechanical Systems	MEMS-NEMS
MS13	Nonlinear Dynamics in Biological Systems	Nonlin. Dyn. in Biol.
MS14	Nonlinear Dynamics for Engineering Design	Nonlin. Dyn. Eng. Design
MS15	Energy Transfer and Harvesting in Nonlinear Systems	Energy Transfer
MS16	Random Dynamical Systems - Recent Advances and New Directions	Random Dyn. Sys.
MS17	Time-periodic systems	Time-periodic Sys.
MS18	Control and Synchronization in Nonlinear Systems	Control
MS19	Fluid-Structure Interaction	Fluid-Structure
MS20	Wave Propagation in Mechanical Systems	Wave Propagation
MS21	Traffic and Vehicle Dynamics	Traffic&Vehicle

# DETAILED PROGRAMME

## Sunday, 25 June 2017

15.00-21.00      **Registration**

19.00-21.00      **Ice breaker**  
Aula of Building K,  
Budapest University of Technology and Economics

## Monday, 26 June 2017

### Room 1 (KF51)

9:30-10:30      **Opening Ceremony**

10:30-11:00      **Coffee break**

### Room 1 (KF51)

11:00-12:00      **Keynote lecture**

**Particles - Simulating Complicated Processes  
with Meshfree Methods**

Peter Eberhard

*University of Stuttgart, Germany*

12:00-13:30      **Lunch break**

**13:30 - 15:30 MS 09 / I.**  
**Nonlinear Dynamics in Engineering Systems**

**Chair:**

Yuri Vladimirovich Mikhlin

**Co-chair:**

Alois Steindl

**13:30**

**ID 33**

**Response regimes in equivalent mechanical model of weakly nonlinear liquid sloshing**

Maor Farid, Oleg Gendelman

*Technion – Israel Institute of Technology, Department of Mechanical Engineering, Haifa, Israel*

**13.50**

**ID 89**

**Inertial effects in thermoacoustic subcritical bifurcation**

Giacomo Bonciolini, Edouard Boujo, Nicolas Noiray

*ETH Zürich, Mechanical Engineering Department, Zürich, Switzerland*

**14.10**

**ID 138**

**Bifurcation analysis of non-smooth floating bodies**

Dane Sequeira, Brian Mann

*Duke University, Mechanical Engineering and Materials Science, Durham, USA*

**14.30**

**ID 272**

**Flutter instability of a visco-elastic belt drive**

Alois Steindl

*Vienna University of Technology, Institute for Mechanics and Mechatronics,*

*Vienna, Austria*

**14.50**

**ID 338**

**Motion planning problem for a finite-dimensional approximation of the Navier-Stokes equations**

Alexander Zuyev

*Max Planck Institute for Dynamics of Complex Technical Systems, Computational Methods in Systems and Control Theory, Magdeburg, Germany*

**15.10**

**ID 456**

**Forced vibrations of a string in the presence of a smooth unilateral obstacle**

Harkirat Singh, Pankaj Wahi

*Indian Institute of Technology Kanpur, Mechanical Engineering, Kanpur, India*



**13:30 - 15:30 MS 11 / I.**  
**Systems with Time Delay**

**Chair:**  
Zaihua Wang

**Co-chair:**  
Tamas Insperger

**13:30 ID 373**  
**Control of amplitude chimeras by time delay in dynamical networks**  
Eckehard Schöll

*Technische Universität Berlin, Physics, Berlin, Germany*

**13.50 ID 62**  
**Delay-differential equations applied to queueing theory**  
Jamol Pender<sup>1</sup>, Richard Rand<sup>2</sup>, Elizabeth Wesson<sup>2</sup>  
<sup>1</sup>*Cornell University, Department of Operations Research and Information Engineering, Ithaca, USA*  
<sup>2</sup>*Cornell University, Department of Mathematics, Ithaca, USA*

**14.10 ID 366**  
**Folding tori and Chenciner bubbles in an ENSO model with delayed feedback**  
Andrew Keane, Bernd Krauskopf, Claire Postlethwaite  
*University of Auckland, Department of Mathematics, Auckland, New Zealand*

**14.30 ID 117**  
**Period-1 oscillations of a state-dependent delayed TCP model with PIE queue management policy via high-dimensional harmonic balance method**  
Lijun Pei  
*Zhengzhou University, School of Mathematics and Statistics, Zhengzhou, China*

**14.50 ID 51**  
**Optimization criterions of a multi-time-delay controlled isolation system with asymmetrical nonlinearity**  
Xiuting Sun<sup>1</sup>, Shu Zhang<sup>2</sup>, Jian Xu<sup>2</sup>, Huijie Yu<sup>1</sup>, Shenlong Wang<sup>1</sup>, Yao Yan<sup>3</sup>  
<sup>1</sup>*University of Shanghai for Science and Technology, Department of Mechanical Engineering, Shanghai, China*  
<sup>2</sup>*Tongji University, School of Aerospace Engineering and Applied Mechanics, Shanghai, China*  
<sup>3</sup>*University of Electronic Science and Technology of China, School of Aeronautics and Astronautics, Chengdu, China*

15.10

**ID 447**

**Galerkin approximations for the pole placement of time delayed systems**

Shanti Swaroop Kandala, C. P. Vyasarayani

*Indian institute of Technology Hyderabad, Department of Mechanical and Aerospace Engineering, Hyderabad, India*

**Room 3 (K155)**

**13:30 - 15:30**

**MS 03 / I.**

**Computational Methods**

**Chair:**

Harry Dankowicz

**Co-chair:**

András Árpád Sipos

**13:30**

**ID 166**

**Computing solution surfaces of quasilinear PDE's by continuation**

Pablo Aguirre

*Universidad Técnica Federico Santa María, Departamento de Matemática, Valparaíso, Chile*

**13.50**

**ID 268**

**Bifurcation analysis of nonlinear normal modes with the harmonic balance method**

Clément Grenat<sup>1</sup>, Sébastien Baguet<sup>1</sup>, Régis Dufour<sup>1</sup>,  
Claude Henri Lamarque<sup>2</sup>

<sup>1</sup>INSA Lyon (Institut National des Sciences Appliquées), LaMCoS CNRS UMR 5259, Villeurbanne, France

<sup>2</sup>ENTPE (Ecole Nationale des Travaux Publics de l'Etat), LTDS, UMR CNRS 5513, Vaulx-en-Velin, France

**14.10**

**ID 337**

**Control-based continuation of unstable pedestrian flows**

Ilias Panagiotopoulos

*University of Rostock, Department of Mathematics, Rostock, Germany*

**14.30**

**ID 376**

**Embedded construction of adjoint equations for optimization using continuation**

Mingwu Li, Cole Anderson, Harry Dankowicz

*University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, Illinois, USA*

**MONDAY**

14.50

**ID 434**

**Tracking critical points on evolving curves and surfaces**

Gábor Domokos<sup>1</sup>, Zsolt Lángi<sup>2</sup>, András Árpád Sipos<sup>1</sup>

<sup>1</sup>Budapest University of Technology and Economics, Department of Mechanics, Materials and Structures, Budapest, Hungary

<sup>2</sup>Budapest University of Technology and Economics, Department of Geometry, Budapest, Hungary

15.10

**ID 451**

**Continuation of periodic orbits in symmetric conservative systems: an application to the planar  $2k+1$  body problem**

Jorge Galan Vioque<sup>1</sup>, Abimael Bengochea<sup>2</sup>,  
Ernesto Perez Chavela<sup>3</sup>

<sup>1</sup>Universidad de Sevilla, Departamento de Matemática, Sevilla, Spain

<sup>2</sup>Universidad Autonoma Mexico, Departamento de Matemática, Mexico City, Mexico

<sup>3</sup>Instituto Tecnológico Autónomo de México, Departamento de Matemática, Mexico City, Mexico

**Room 4 (K134)**

13:30 - 15:30

**MS 08 / I.**

**Nonlinear Phenomena in Mechanical and Structural Systems**

**Chair:**

Bala Balachandran

**Co-chair:**

Sotirios Natsiavas

13:30

**ID 18**

**Irregular dynamics of an elliptic vortex in an oscillatory nonlinear flow**

Eugene Ryzhov<sup>1</sup>, Konstantin Koshel<sup>1</sup>, Dmitry Ovcharenko<sup>2</sup>

<sup>1</sup>Pacific Oceanological Institute of FEB RAS, Geophysical Hydrodynamics, Vladivostok, Russia

<sup>2</sup>Far Eastern Federal University, Applied Mechanics, Vladivostok, Russia

13:50

**ID 106**

**Heave-pitch-roll nonlinear dynamics of a spar platform**

Elvidio Gavassoni

Federal University of Paraná, Department of Civil Construction, Curitiba, Brazil

14.10

**ID 294**

**Steady streaming in a vibrating channel with ratchet**

Jie Yu

Stony Brook University, Department of Civil Engineering, Stony Brook, United State of America

**MONDAY**

- 14.30** **ID 382**  
**Bifurcations in implicit map - application to surface location error in milling processes**  
Adam Kiss K, Daniel Bachrathy, Gábor Stépán  
*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*
- 14.50** **ID 97**  
**Nonlinear resonances of a rigid-flexible antenna system**  
Bensong Yu, Bensong Jin, Xiumin Gao, Ti Chen  
*Nanjing University of Aeronautics and Astronautics, State Key Lab of Mechanics and Control of Mechanical Structures, Nanjing, China*
- 15.10** **ID 370**  
**Nonlinear vibrations of viscoelastic cylindrical shells with internal flowing fluid**  
Zenon Del Prado<sup>1</sup>, Paulo Gonçalves<sup>2</sup>  
<sup>1</sup>*Federal University of Goias, School of Civil Engineering, Goiania, Brazil*  
<sup>2</sup>*Pontifícia Universidade Católica do Rio de Janeiro, Department of Civil Engineering, Rio de Janeiro, Brazil*

## Room 5 (K150)

- 13:30 - 15:30** **MS 18 / I.**  
**Control and Synchronization in Nonlinear Systems**
- Chair:** Nathan van de Wouw  
**Co-chair:** Marc Jungers
- 13:30** **ID 100**  
**Control of mechanical systems with uncertain set-valued friction**  
Ruud Beerens, Maurice Heemels, Nathan Van de Wouw, Henk Nijmeijer  
*Eindhoven University of Technology, Department of Mechanical Engineering, Eindhoven, The Netherlands*
- 13.50** **ID 111**  
**Control of multistability in vibro-impact systems**  
Yang Liu  
*University of Exeter, College of Engineering, Mathematics and Physical Sciences, Exeter, United Kingdom*
- 14.10** **ID 203**  
**On the problem of control resonance oscillations of a mechanical system with unbalanced exciters**  
Sergey Eremeykin, Grigory Panovko, Alexander Shokhin  
*Mechanical Engineering Research Institute of RAS, Department of Vibrational Bio-Mechanics, Moscow, Russia*

**MONDAY**

14.30

**ID 221**

**Sufficient conditions for convergence of discrete-time Lur'e type systems**

Marc Jungers<sup>1</sup>, Nathan Van de Wouw<sup>2</sup>

<sup>1</sup>CNRS, Centre de Recherche en Automatique de Nancy (CRAN), Nancy, France

<sup>2</sup>Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands

14.50

**ID 240**

**Active vibration control of a nonlinear system using pole placement**

Maryam Ghandchi Tehrani<sup>1</sup>, Gaetan Kerschen<sup>2</sup>,  
Thibaut Detroux<sup>2</sup>

<sup>1</sup>University of Southampton, Institute of Sound and Vibration Research,  
Southampton, United Kingdom

<sup>2</sup>University of Liege, Department of Aerospace and Mechanical Engineering,  
Liege, Belgium

15.10

**ID 511**

**Autoresonant excitation and control of parametric vibration**

Vladimir Babitsky<sup>1</sup>, Abolfazl Zahedi<sup>2</sup>

<sup>1</sup>Loughborough University, Wolfson School of Mechanical and Manufacturing  
Engineering, Loughborough, United Kingdom

<sup>2</sup>University of Manchester, School of Mechanical, Aerospace and Civil Engineering,  
Manchester, United Kingdom

**Room 6 (KF81)**

13:30 - 15:30

**MS 10 / I.  
Non-Smooth Dynamics**

**Chair:**

Vincent Acary

**Co-chair:**

Remco Ingmar Leine

13:30

**ID 38**

**Control of a vertical mode of a cable by a nonsmooth oscillator**

Alireza Ture Savadkoohi

ENTPE (Ecole Nationale des Travaux Publics de l'Etat), LTDS UMR CNRS 5513,  
Vaulx-en-Velin, France

13.50

**ID 58**

**Investigation of the dynamics of the wiper blade around the reversal**

Motoki Unno<sup>1</sup>, Atsushi Shibata<sup>2</sup>, Hiroshi Yabuno<sup>1</sup>,  
Dai Yanagisawa<sup>3</sup>, Tomonori Nakano<sup>3</sup>

<sup>1</sup>University of Tsukuba, Graduate School of System and Information Engineering, Tsukuba, Japan

<sup>2</sup>Keio University, Faculty of Science and Technology, Yokohama, Japan

<sup>3</sup>Mitsuba Corporation, Kiryu, Japan

**MONDAY**

- 14.10 ID 181**  
**Dynamic analysis of a cantilever beam subject to a moving mass under unilateral constraint**  
 Lucio Demeio  
*Università Politecnica delle Marche, Dipartimento di Ingegneria Industriale e Scienze Matematiche, Ancona, Italy*
- 14.30 ID 259**  
**Towards an optimal control framework for non-smooth mechanical systems**  
 Reza Kianifar, Remco Ingmar Leine  
*University of Stuttgart, Institute for Nonlinear Mechanics, Stuttgart, Germany*
- 14.50 ID 348**  
**Nonlinear dynamics of oscillators with shape memory alloy**  
 Sebastian Tatzko, Jonas Böttcher  
*Institute of Dynamics and Vibration Research, Leibniz Universität Hannover, Department of Mechanical Engineering, Hannover, Germany*
- 15.10 ID 399**  
**On the dynamics of dimpled electrostatic MEMS actuators**  
 Ayman Alneamy<sup>1</sup>, Majed Al-Ghamdi<sup>1</sup>, Mahmoud Khater<sup>2</sup>, Sangtak Park<sup>1</sup>, Eihab Abdel-Rahman<sup>1</sup>, Glenn Heppler<sup>1</sup>, Beichen Li<sup>3</sup>, Ridha Almikhlafi<sup>1</sup>  
<sup>1</sup>University of Waterloo, Systems Design Engineering, Waterloo, Canada  
<sup>2</sup>KFUPM, Mechanical Engineering, Dahrn, Saudi Arabia  
<sup>3</sup>University of Waterloo, Mechanical and Mechatronics Engineering, Waterloo, Canada

## Room 7 (KF88)

- 13:30 - 15:30 MS 07 / I.**  
**Dynamics and Optimization of Multibody Systems**
- Chair:** Felix L. Chernousko  
**Co-chair:** Igor Zeidis
- 13:30 ID 5**  
**Rigidity constraints in analytical mechanics**  
 René Souchet  
*Buxerolles, France*
- 13:50 ID 60**  
**Two-dimensional motion of a body carrying movable internal masses**  
 Felix Chernousko  
*Institute for Problems in Mechanics, Russian Academy of Sciences, Moscow, Russia*

14.10

**ID 173**

**A three field weak formulation for integration of the equations of motion of multibody systems subject to equality constraints**

Elias Paraskevopoulos<sup>1</sup>, Nikolaos Potosakis<sup>1</sup>, Sotirios Natsiavas<sup>2</sup>

<sup>1</sup>*Aristotle University, Thessaloniki, Greece, Department of Mechanical Engineering, Thessaloniki, Greece*

<sup>2</sup>*Aristotle University, Thessaloniki, Greece, Faculty of Mechanical Engineering, Thessaloniki, Greece*

14.30

**ID 362**

**The discretized Coulomb friction model in a non-singular complementarity formulation for multibody systems with contacts**

Albert Peiret<sup>1</sup>, József Kövecses<sup>1</sup>, Josep M. Font-Llagunes<sup>2</sup>

<sup>1</sup>*McGill University, Mechanical Engineering, Montreal, Canada*

<sup>2</sup>*Universitat Politècnica de Catalunya, Mechanical Engineering, Barcelona, Spain*

14.50

**ID 387**

**Locomotion conditions for a two-body system on a rough inclined plane**

Nikolay Bolotnik<sup>1</sup>, Philipp Schorr<sup>2</sup>, Igor Zeidis<sup>2</sup>, Klaus Zimmermann<sup>2</sup>

<sup>1</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences, Laboratory of Robotics and Mechatronics, Moscow, Russia*

<sup>2</sup>*Technische Universität Ilmenau, Department of Mechanical Engineering, Ilmenau, Germany*

15.10

**ID 439**

**Non-reverse motion of a two-body system along a straight line on a rough horizontal plane**

Nikolay Bolotnik<sup>1</sup>, Tatiana Figurina<sup>2</sup>, Pavel Gubko<sup>1</sup>

<sup>1</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences, Laboratory of Robotics and Mechatronics, Moscow, Russia*

<sup>2</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences, Laboratory of Control of Mechanical Systems, Moscow, Russia*

## Room 8 (KF82)

13:30 - 15:30

**MS 19 / I.**

**Fluid-Structure Interaction**

**Chair:**

Andrei Metrikine

**Co-chair:**

Oded Gottlieb

MONDAY

13:30

**ID 202**

**Analysis of stability transitions in a microswimmer with superparamagnetic head**

Yuval Harduf, [Yizhar Or](#)

*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*

13:50

**ID 118**

**Cascade of bifurcations in nonlinear transonic panel flutter oscillations**

Vasily Vedeneev<sup>1</sup>, Anastasia Shishaeva<sup>1</sup>, Andrey Aksenov<sup>2</sup>

<sup>1</sup>*Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia*

<sup>2</sup>*Tesis LTD, Moscow, Russia*

14.10

**ID 150**

**Slow-invariant-manifold resonance capture in vortex-induced vibration of a circular cylinder with a nonlinear dissipative rotator**

Antoine Blanchard<sup>1</sup>, Oleg Gendelman<sup>2</sup>, Lawrence Bergman<sup>1</sup>, [Alexander Vakakis](#)<sup>3</sup>

<sup>1</sup>*University of Illinois at Urbana-Champaign, Department of Aerospace Engineering, Champaign, USA*

<sup>2</sup>*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Tel Aviv, Israel*

<sup>3</sup>*University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, Champaign, USA*

14.30

**ID 204**

**Computing the viscous fluid flow between moving cylinders of an arbitrary cross-section**

Alexander Petrov<sup>1</sup>, Anastasiya Kazakova<sup>2</sup>

<sup>1</sup>*Moscow Institute of Physics and Technology (MIPT), Department of Theoretical Mechanics, Moscow, Russia*

<sup>2</sup>*Chuvash State University, Department of Applied Mathematics, Physics and Information Technologies, Cheboksary, Russia*

14.50

**ID 206**

**Nonlinear damping types in wake oscillator model for vortex-induced vibrations of 2DoF rigid structure**

Victoria Kurushina, Ekaterina Pavlovskaja, Marian Wiercigroch

*University of Aberdeen, Centre for Applied Dynamics Research, Aberdeen, United Kingdom*

15.10

**ID 261**

**Flow-induced vibration of a D-shape cylinder**

Jisheng Zhao, Mark C. Thompson, [Kerry Hourigan](#)

*Monash University, Department of Mechanical and Aerospace Engineering, Melbourne, Australia*

MONDAY



**13:30 - 15:30 MS 06 / I.**  
**Fractional Derivatives**

**Chair:**  
Riccardo Caponetto

**Co-chair:**  
Masaharu Kuroda

**13:30 ID 59**  
**Fractional-order controller design based on the Nyquist diagram for the vibration control of a flexible beam**  
Naoki Yoshitani, Masaharu Kuroda

*University of Hyogo, Department of Mechanical Engineering, Himeji, Japan*

**13.50 ID 363**  
**Chaos control in fractional-order systems using fractional Chebyshev collocation method**

Eric Butcher, Morad Nazari, Arman Dabiri

*University of Arizona, Aerospace and Mechanical Engineering, Tucson, USA*

**14.10 ID 521**  
**Numerical solving unsteady space-fractional problems**  
Petr Vabishchevich

*Russian Academy of Sciences, Nuclear Safety Institute, Moscow, Russia*

**14.30 ID 2**  
**Calculus on Smith-Volterra-Cantor sets**

Alireza Khalili Golmankhaneh

*Islamic Azad University, Urmia Branch, Department of Physics, Urmia, Iran*

**14.50 ID 432**  
**Fractional order PI gimbal control**  
Giuseppe Avon<sup>1</sup>, Riccardo Caponetto<sup>1</sup>, Gabriella Xibilia<sup>2</sup>

<sup>1</sup>*University of Catania, DIEEI, Catania, Italy*

<sup>2</sup>*Università di Messina, Dipartimento di Ingegneria, Messina, Italy*

**15.10 ID 353**  
**Feedback PDalpha type iterative learning control for fractional-order human arm-support nonlinear system**

Mihailo Lazarevic<sup>1</sup>, Nikola Djurovic<sup>1</sup>, Milan Cajic<sup>2</sup>,  
Boško Cvektovic<sup>1</sup>, Petar Mandic<sup>1</sup>, Ljubiša Bucanovic<sup>3</sup>

<sup>1</sup>*University of Belgrade, Faculty of Mechanical Engineering, Department of Mechanics, Belgrade, Serbia*

<sup>2</sup>*SASA, Department of Mechanics, Belgrade, Serbia*

<sup>3</sup>*Messer Tehnogas, Department EEMCS, Belgrade, Serbia*

**15:30-16:00 Coffee break**

**16.00 - 18.00 MS 09 / II.**  
**Nonlinear Dynamics in Engineering Systems**

**Chair:**  
Alois Steindl

**Co-chair:**  
Alexander Fidlin

**16.00 ID 87**  
**On the dynamics of friction based tuned mass dampers**  
Alexander Fidlin, Nigora Gafur  
*Karlsruhe Institute of Technology, Institute of Engineering Mechanics, Karlsruhe, Germany*

**16.20 ID 465**  
**On the effect of the deformed state of a tire on the combined wheel's rolling, sliding, and spinning with dry friction**  
Sergey I. Zhavoronok<sup>1</sup>, Alexey A. Kireenkov<sup>2</sup>  
*<sup>1</sup>Institute of Applied Mechanics, Russian Academy of Sciences, Mechanics of Smart and Composite Materials and Systems, Moscow, Russia*  
*<sup>2</sup>Ishlinsky Institute for Problems in Mechanics RAS - Moscow Institute of Physics and Technology (State University), Laboratory of Mechanics of Systems Department of Higher Mathematics, Moscow - Dolgoprudny, Russia*

**16.40 ID 473**  
**Improved theory of the combined dry friction in problems of pneumatics' dynamics**  
Alexey A. Kireenkov<sup>1</sup>, Sergey I. Zhavoronok<sup>2</sup>  
*<sup>1</sup>Ishlinsky Institute for Problems in Mechanics RAS - Moscow Institute of Physics and Technology (State University), Laboratory of Mechanics of Systems Department of Higher Mathematics, Moscow - Dolgoprudny, Russia*  
*<sup>2</sup>Institute of Applied Mechanics, Russian Academy of Sciences, Mechanics of Smart and Composite Materials and Systems, Moscow, Russia*

**17.00 ID 476**  
**Vibration decay and positioning time of sampled-data systems with dry friction**  
Csaba Budai<sup>1</sup>, László Kovács<sup>2</sup>, József Kövecses<sup>2</sup>, Gábor Stépán<sup>3</sup>  
*<sup>1</sup>Budapest University of Technology and Economics, Department of Mechatronics, Optics and Mechanical Engineering Informatics, Budapest, Hungary*  
*<sup>2</sup>McGill University, Department of Mechanical Engineering, Montreal, Canada*  
*<sup>3</sup>Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

17.20

**ID 513**

**Numerical method for nonlinear vibration of contact joint structures**

Loic Salles<sup>1</sup>, Luca Pesaresi<sup>2</sup>, Jason Armand<sup>1</sup>

<sup>1</sup>Vibration University Technology Center, Department of Mechanical Engineering, Imperial College, London, United Kingdom

<sup>2</sup>Vibration University Technology Center, Department of Mechanical Engineering, Imperial College, London, United Kingdom

17.40

**ID 410**

**Building a test equipment for measuring chaotic behaviour in a frictional oscillator**

Gábor Licskó, Gábor Csernák, Gábor Stépán

Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary

**Room 2 (K174)**

16.00 - 18.00

**MS 11 / II.**

**Systems with Time Delay**

**Chair:**

Tamás Insperger

**Co-chair:**

Giuseppe Habib

16.00

**ID 50**

**An online control strategy for time delayed vibration absorber**

Feng Wang, Jian Xu

Tongji University, School of Aerospace Engineering and Applied Mechanics, Shanghai, China

16.20

**ID 80**

**A probabilistic approach towards robust stability optimization, with application to vibration control**

Luca Fenzi<sup>1</sup>, Dan Pilbauer<sup>1</sup>, Wim Michiels<sup>1</sup>, Tomas Vyhldal<sup>2</sup>

<sup>1</sup>KU Leuven, Department of Computer Science, Heverlee, Belgium

<sup>2</sup>Czech Technical University in Prague, Department of Instrumentation and Control Engineering, Prague, Czech Republic

16.40

**ID 95**

**Experiment and analysis of active vibration suppression via an absorber with a tunable delay**

Yixia Sun<sup>1</sup>, Jian Xu<sup>2</sup>

<sup>1</sup>Shanghai University of Engineering Science, School of Mechanical Engineering, Shanghai, China

<sup>2</sup>Tongji University, School of Aerospace Engineering and Applied Mechanics, Shanghai, China

MONDAY

17.00

**ID 108**

**Cable substructuring with feedback delay**

Nandor Terkovics<sup>1</sup>, Simon Neild<sup>2</sup>, Mark Lowenberg<sup>1</sup>,  
Robert Szalai<sup>3</sup>

<sup>1</sup>University of Bristol, Department of Aerospace Engineering, Bristol, United Kingdom

<sup>2</sup>University of Bristol, Department of Mechanical Engineering, Bristol, United Kingdom

<sup>3</sup>University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom

17.20

**ID 392**

**A nonlinear tuned vibration absorber for chatter mitigation**

Giuseppe Habib<sup>1</sup>, Gaetan Kerschen<sup>2</sup>, Gabor Stepan<sup>1</sup>

<sup>1</sup>Budapest University of Technology and Economics, Department of Applied Mechanics,  
Budapest, Hungary

<sup>2</sup>University of Liege, Aerospace and Mechanical Engineering, Liege, Belgium

**Room 3 (K155)**

16.00 - 18.00

**MS 03 / II.**

**Computational Methods**

**Chair:**

Jan Sieber

**Co-chair:**

Roberto Barrio

16.00

**ID 63**

**Topological changes in slow-fast systems: chaotic neuron models**

Roberto Barrio

University of Zaragoza, Department of Applied Mathematics, Zaragoza, Spain

16.20

**ID 134**

**Differential equations with state-dependent delays -  
smooth center manifolds and normal forms**

Jan Sieber

University of Exeter, College of Engineering, Mathematics and Physical Sciences,  
Exeter, United Kingdom

16.40

**ID 279**

**Numerical approximation of invariant manifolds for  
dynamical systems with simultaneous self- and forced  
excitation**

Robert Fiedler, Hartmut Hetzler

University of Kassel, Department of Mechanical Engineering, Kassel, Germany

MONDAY

17.00

**ID 290**

**A neutral homoclinic bifurcation in a 3D map**

H. G. E. Meijer<sup>1</sup>, W. Govaerts<sup>2</sup>, Y. A. Kuznetsov<sup>1,3</sup>, N. Neirynck<sup>2</sup>

<sup>1</sup>University of Twente, Department EEMCS, Enschede, The Netherlands

<sup>2</sup>Ghent University, Department of Applied Mathematics and Computer Science, Ghent, The Netherlands

<sup>3</sup>Utrecht University, Department of Mathematics, Utrecht, The Netherlands

17.20

**ID 149**

**Homoclinic orbits embedded in one-dimensional invariant manifolds of maps**

Niels Neirynck<sup>1</sup>, Willy Govaerts<sup>1</sup>, Hil Meijer<sup>2</sup>

<sup>1</sup>Ghent University, Department of Applied Mathematics, Computer Science and Statistics, Ghent, Belgium

<sup>2</sup>University of Twente, Department of Applied Mathematics, Enschede, The Netherlands

17.40

**ID 379**

**Global manifolds parametrised by isochrons**

James Hannam, Bernd Krauskopf, Hinke Osinga

University of Auckland, Department of Mathematics, Auckland, New Zealand

**Room 4 (K134)**

16.00 - 18.00

**MS 08 / II.**

**Nonlinear Phenomena in Mechanical and Structural Systems**

**Chair:**

Sotirios Natsiavas

**Co-chair:**

Jerzy Warmiński

16.00

**ID 238**

**Inherent control error in a multi-PD controlled double inverted pendulum**

Gergely Gyebroőszki<sup>1</sup>, Gábor Csernák<sup>2</sup>

<sup>1</sup>Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary

<sup>2</sup>MTA-BME Research Group on Dynamics of Machines and Vehicles, Budapest, Hungary

16.20

**ID 252**

**Modes of vibration of nanobeams vibrating with large displacements and actuated by DC electric tensions**

Marco Alves<sup>1</sup>, Pedro Ribeiro<sup>2</sup>

<sup>1</sup>Faculty of Engineering, University of Porto, DEMec, Porto, Portugal

<sup>2</sup>Faculty of Engineering, University of Porto, DEMec/INEGI, Porto, Portugal

**MONDAY**

16.40

**ID 345**

**Experimental investigation of the friction-induced instabilities at the origin of wet belt squeal**

Simon Gatignol<sup>1</sup>, Thierry Demassougne<sup>2</sup>, Alain Le Bot<sup>1</sup>

<sup>1</sup>Laboratoire de Tribologie et de Dynamique des Systèmes, TPCDI, Lyon, France

<sup>2</sup>HUTCHINSON, HUTCHINSON SNC, Joué-lès-Tours, France

17.00

**ID 402**

**Experimental nonlinear phenomena in structures with multiple equilibria controlled by boundary displacements: ultra-fast decay of coupled vibrations**

Ioannis Georgiou<sup>1</sup>, Anil Bajaj<sup>2</sup>

<sup>1</sup>National Technical University of Athens, School of Naval Architecture and Marine Engineering, Athens, Greece

<sup>2</sup>Purdue University, School of Mechanical Engineering, West Lafayette, USA

17.20

**ID 499**

**Frequency response of P-mode intrinsic localized mode**

Edmon Perkins

Auburn University, Department of Mechanical Engineering, Auburn, USA

17.40

**ID 507**

**Analysis of dry galloping on inclined cables under stationary wind**

Daniele Zulli<sup>1</sup>, Giuseppe Piccardo<sup>2</sup>, Angelo Luongo<sup>1</sup>

<sup>1</sup>University of L'Aquila, Department of Civil, Architectural and Environmental Engineering, L'Aquila, Italy

<sup>2</sup>University of Genoa, Department of Civil, Chemical and Environmental Engineering, Genoa, Italy

**Room 5 (K150)**

16.00 - 18.00

**MS 18 / II.**

**Control and Synchronization in Nonlinear Systems**

**Chair:**

Bernard Brogliato

**Co-chair:**

Nathan van de Wouw

16.00

**ID 37**

**A real-time gesture classification using surface EMG to control a robotics hand**

Yannick Aoustin

University of Nantes, Department of Mechanical Engineering, Nantes, France

**MONDAY**

16.20

**ID 75**

**Reference spreading trajectory tracking control:  
experimental analysis on a one-degree-of-freedom setup**

Mark Rijnen, Alessandro Saccon, Henk Nijmeijer

*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

16.40

**ID 229**

**Dynamic control of 3D directional drilling systems  
with state estimation**

Octavio Antonio Villarreal Magaña<sup>1</sup>, Emmanuel Detournay<sup>2</sup>,  
Nathan Van de Wouw<sup>3</sup>

<sup>1</sup>*Delft University of Technology, Delft Center for Systems and Control,  
Delft, The Netherlands*

<sup>2</sup>*University of Minnesota, Department of Civil, Environmental and Geo-Engineering,  
Minneapolis, USA*

<sup>3</sup>*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

17.00

**ID 316**

**Position control of an electro-pneumatic clutch using  
Takagi-Sugeno techniques**

Robert Prabel, Harald Aschemann

*University of Rostock, Faculty of Mechanical Engineering, Rostock, Germany*

17.20

**ID 20**

**Decentralized guaranteed cost control for synchronization  
in networks of linear singularly perturbed systems**

Jihene Ben Rejeb<sup>1</sup>, Irinel-Constantin Morarescu<sup>2</sup>,  
Jamal Daafouz<sup>2</sup>

<sup>1</sup>*University of Lorraine, Nancy, France*

<sup>2</sup>*University of Lorraine, School of Mechanical and Electrical Engineering, Nancy, France*

**Room 6 (KF81)**

16.00- 18.00

**MS 10 / II.**

**Non-Smooth Dynamics**

**Chair:**

Claude-Henri Lamarque

**Co-chair:**

Vincent Acary

**MONDAY**

- 16.00 ID 73**  
**Anisotropic dry friction with non-convex force reservoirs: modeling and experiments**  
 Simon Walker, Remco Ingmar Leine  
*University of Stuttgart, Institute for Nonlinear Mechanics, Stuttgart, Germany*
- 16.20 ID 248**  
**An augmented Lagrangian frictional contact formulation for nonsmooth multibody systems**  
 Javier Galvez Buezo<sup>1</sup>, Alberto Cardona<sup>2</sup>, Federico Cavalieri<sup>2</sup>, Olivier Bruls<sup>1</sup>  
<sup>1</sup>*University of Liege, Department of Aerospace and Mechanical Engineering, Liege, Belgium*  
<sup>2</sup>*Centro de Investigación de Métodos Computacionales (CIMEC), Santa Fe, Argentina*
- 16.40 ID 282**  
**Lyapunov stability of a planar rigid body with two frictional point contacts**  
 Péter L. Várkonyi<sup>1</sup>, Yizhar Or<sup>2</sup>  
<sup>1</sup>*Budapest University of Technology and Economics, Department of Mechanics, Materials and Structures, Budapest, Hungary*  
<sup>2</sup>*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*
- 17.00 ID 368**  
**Frictional passive damping in a beam on foundation under moving loads**  
 Rita Corrêa, Fernando Simões, António Pinto da Costa  
*Departamento de Engenharia Civil, Instituto Superior Técnico, Lisboa, Portugal*
- 17.20 ID 440**  
**Discontinuous dynamics of wheels with a towed axis**  
 Mate Antali, Gabor Stepan  
*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

## Room 7 (KF88)

- 16.00- 18.00 MS 07 / II.**  
**Dynamics and Optimization of Multibody Systems**
- Chair:** József Kövecses      **Co-chair:** Stefan Chwastek
- 16.00 ID 15**  
**Selected aspects involved in dynamics and optimization of cranes with a pivoting boom**  
 Stefan Chwastek  
*Cracow University of Technology, Mechanical Department, Cracow, Poland*

**MONDAY**



16.20

**ID 16**

**Model of person balancing on the seesaw**

Alexander Formalskii, Pavel Kruchinin

*Lomonosov Moscow State University, Department of Applied Mechanics and Control,  
Moscow, Russia*

16.40

**ID 167**

**Dynamically balanced optimal gait generations for the biped walking on stairs using GA and GA-NN**

Lulu Gong, Yunpeng Li, Ruowei Zhao, Zhenghai Zhang,  
Weikang Zeng

*Tongji University, School of Life Sciences and Technology, Shanghai, China*

17.00

**ID 196**

**Chain fountain dynamics**

Friedrich Pfeiffer<sup>1</sup>, Johannes Mayet<sup>2</sup>

<sup>1</sup>*Technical University of Munich, Institute for Applied Mechanics, Muenchen, Germany*

<sup>2</sup>*Technical University of Munich, Institute for Applied Mechanics, Muenchen, Georgia*

17.20

**ID 217**

**Analysis of passive wearable spring-clutch device for energy saving during walking**

Roei Keren, Yizhar Or

*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*

17.40

**ID 235**

**Analysis of underactuated dynamic locomotion systems using perturbation expansion - the twistcar toy example**

Ofir Chakon, Yizhar Or

*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*

**Room 8 (KF82)**

16.00- 18.00

**MS 19 / II.**

**Fluid-Structure Interaction**

**Chair:**

Oded Gottlieb

**Co-chair:**

Kerry Hourigan

16.00

**ID 135**

**Robust maneuver load alleviation via LPV aeroservoelastic model**

Hongkun Li, Huang Rui, Yonghui Zhao, Haiyan Hu

*Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering,  
Nanjing, China*

**MONDAY**

16.20

**ID 179**

**Modular approach for the modeling and dynamic analysis of a pipe conveying fluid**

Renato Maia Matarazzo Orsino, Celso Pupo Pesce

*Universidade de São Paulo, Departamento de Engenharia Mecânica, São Paulo, Brazil*

16.40

**ID 109**

**Periodic regimes caused by ice-fluid-simple oscillator interaction**

Andrei Abramian<sup>1</sup>, Dmitry Indeitsev<sup>2</sup>

<sup>1</sup>*Institute of Problems of Mechanical Engineering Russian Academy of Sciences, Department of Applied Mathematics, Saint Petersburg, Russia*

<sup>2</sup>*Institute of Problems of Mechanical Engineering Russian Academy of Sciences, Applied Mechanics, Saint Petersburg, Russia*

17.00

**ID 274**

**Stabilization of a multi-tethered lighter-than-air rigid-body sphere undergoing vortex-induced vibrations in uniform flow**  
La Mi<sup>1</sup>, Oded Gottlieb<sup>2</sup>

<sup>1</sup>*Technion – Israel Institute of Technology, Autonomous Systems and Robotics Program, Haifa, Israel*

<sup>2</sup>*Technion – Israel Institute of Technology, Mechanical Engineering, Haifa, Israel*

17.20

**ID 515**

**Intermittent oscillations of elastic structure in fluctuating axial fluid flow**

S. Krishna Kumar<sup>1</sup>, Sayan Gupta<sup>2</sup>, Sunetra Sarkar<sup>3</sup>

<sup>1</sup>*Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai, India*

<sup>2</sup>*Department of Applied Mechanics, Indian Institute of Technology Madras, Applied Mechanics, Chennai, India*

<sup>3</sup>*Department of Aerospace Engineering, Indian Institute of Technology Madras, Aerospace Engineering, Chennai, India*

17.40

**ID 284**

**Flutter of plate in one side flow**

Lifeng Wang

*Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering, Nanjing, China*

**16.00- 18.00 MS 06 / II.  
Fractional Derivatives**

**Chair:**  
Dana Copot

**Co-chair:**  
Péter Béda

**16.00**

**ID 9**

**Contributions of the pool of long-lived chronically infected CD4+ T cells in HIV dynamics: a fractional-order approach**

Ana Carvalho<sup>1</sup>, Carla Pinto<sup>2</sup>

<sup>1</sup>*Faculty of Sciences, University of Porto, Department of Mathematics, Porto, Portugal*

<sup>2</sup>*School of Engineering, Polytechnic of Porto, Porto, Portugal*

**16.20**

**ID 116**

**Generic bifurcations at nonlocal continua described by fractional calculus**

Peter Béda

*Budapest University of Technology and Economics, Department of Vehicle Elements and Vehicle-structure Analysis, Budapest, Hungary*

**16.40**

**ID 160**

**Stability of fractional positive continuous-time and discrete-time nonlinear systems**

Tadeusz Kaczorek

*Bialystok University of Technology, Faculty of Electrical Engineering, Bialystok, Poland*

**17.00**

**ID 180**

**Combined resonance of a nonlocal nanobeam on fractional Pasternak-type viscoelastic foundation**

Milan Cajić<sup>1</sup>, Danilo Karličić<sup>1</sup>, Mihailo Lazarević<sup>2</sup>, Wen Chen<sup>3</sup>

<sup>1</sup>*Mathematical Institute of Serbian Academy of Sciences and Arts, Department of Mechanics, Belgrade, Serbia*

<sup>2</sup>*University of Belgrade - Faculty of Mechanical Engineering, Department of Mechanics, Belgrade, Serbia*

<sup>3</sup>*Hohai University, Institute of Soft Matter Mechanics, Department of Engineering Mechanics, Nanjing, China*

**17.20**

**ID 242**

**Generalized fractional order reset element (GFrORE)**

Niranjan Saikumar, Hassan HosseinNia

*Technische Universiteit Delft, Precision and Microsystem Engineering, Delft, The Netherlands*

Tuesday, 27 June, 2017

Room 1 (KF51)

08.30 - 10.30    **MS 09 / III.**  
**Nonlinear Dynamics in Engineering Systems**

**Chair:**  
Livija Cveticanin

**Co-chair:**  
Yuri Vladimirovich Mikhlin

08.30    **ID 110**  
**Forced and damped solitons in cyclic and symmetric structures**

Filipe Fontanela<sup>1</sup>, Aurelien Grolet<sup>2</sup>, Loic Salles<sup>1</sup>,  
Amin Chabchoub<sup>3</sup>, Norbert Hoffmann<sup>1</sup>

<sup>1</sup>Imperial College London, Department of Mechanical Engineering,  
London, United Kingdom

<sup>2</sup>Arts et Metiers ParisTech, Department of Mechanical Engineering, Lille, France

<sup>3</sup>Aalto University, Department of Mechanical Engineering, Aalto, Finland

08.50    **ID 283**  
**On a family of gradient-free control functions  
for extremum seeking problems**

Victoria Grushkovskaya, Christian Ebenbauer

University of Stuttgart, Institute for Systems Theory and Automatic Control,  
Stuttgart, Germany

09.10    **ID 305**  
**Non-classical nonlinear normal vibration modes  
in mechanical systems**

Yuri Vladimirovich Mikhlin

National Technical University "KhPI", Applied Mathematics, Kharkov, Ukraine

09.30    **ID 377**  
**Preloading in nonlinear oscillator**  
Zvonko Rakaric, Livija Cveticanin, Miodrag Zukovic

University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia

**08.30 - 10.30 MS 11 / III.**  
**Systems with Time Delay**

**Chair:**  
Eric Butcher

**Co-chair:**  
Zaihua Wang

**08.30 ID 105**  
**Stability analysis of machining processes with parameter uncertainty**  
Dominik Hamann, Nico-Philipp Walz, Achim Fischer, Michael Hanss, Peter Eberhard  
*University of Stuttgart, Institute of Engineering and Computational Mechanics, Stuttgart, Germany*

**08.50 ID 245**  
**Influence of frictional mechanism on chatter vibrations in cutting process**  
Andrzej Weremczuk, Rafał Rusinek, Jerzy Warmański  
*Lublin University of Technology, Department of Applied Mechanics, Lublin, Poland*

**09.10 ID 384**  
**Runout in milling: Tiny cause with significant effects**  
Andreas Otto, Günter Radons  
*Chemnitz University of Technology, Institute of Physics, Chemnitz, Germany*

**09.30 ID 416**  
**Dynamics in milling pocket structures**  
Song Ren, Xinhua Long  
*Shanghai Jiao Tong University, Department of Mechanical Engineering, Shanghai, China*

**09.50 ID 431**  
**Fast and accurate estimation of the unconditional stability threshold in milling by including the effects of tooling system bending**  
Giovanni Totis, Marco Sortino  
*University of Udine, Polytechnic Department of Engineering and Architecture, Udine, Italy*

**10.10 ID 466**  
**A mechanistic ploughing model for chatter magnitude limitation in thin-walled parts turning**  
Mikhail Guskov  
*Arts et Metiers ParisTech, PIMM Laboratory, Paris, France*

**08.30 - 10.30 MS 03 / III.**  
**Computational Methods**

**Chair:**  
Themistoklis Sapsis

**Co-chair:**  
Robert Szalai

**08.30 ID 69**  
**Capturing similarity solutions in multidimensional Burgers' equation**  
Jens Rottmann-Matthes  
*Karlsruhe Institute of Technology, Department of Mathematics, Karlsruhe, Germany*

**08.50 ID 374**  
**Differential positivity for nonlinear consensus**  
Fulvio Forni  
*University of Cambridge, Department of Engineering, Cambridge, United Kingdom*

**09.10 ID 420**  
**Nonlinear model identification and spectral submanifolds for multi-degree-of-freedom mechanical vibrations**  
Robert Szalai<sup>1</sup>, George Haller<sup>2</sup>  
<sup>1</sup>*University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom*  
<sup>2</sup>*ETH Zürich, Mechanical Engineering, Zürich, Switzerland*

**09.30 ID 469**  
**Harmonic balance method with iterative frequency technique for nonlinear oscillators**  
Tien Hoang, Denis Duhamel, Gilles Foret  
*Ecole des Ponts ParisTech, Laboratoire NAVIER, Champs sur Marne, France*

**09.50 ID 493**  
**Robustness of coherent sets computations**  
Kathrin Padberg-Gehle, Anna Kluecker  
*Leuphana University of Lüneburg, Applied Mathematics, Lüneburg, Germany*

**08.30 - 10.30 MS 08 / III.**  
**Nonlinear Phenomena in Mechanical and Structural Systems**

**Chair:**  
Jerzy Warmański

**Co-chair:**  
Bala Balachandran

**08.30 ID 227**  
**Experimental validation of vibro-impact force models using numeric simulation and perturbation methods**  
Geraldo Rebouças, Ilmar Santos, Jon Juel Thomsen  
*Technical University of Denmark, Department of Mechanical Engineering, Kgs. Lyngby, Denmark*

**08.50 ID 234**  
**Parametric vibrations of a rotating thin-walled composite blade subjected to base excitation**  
Jarosław Latański, Jerzy Warmański  
*Lublin University of Technology, Applied Mechanics, Lublin, Poland*

**09.10 ID 323**  
**Modeling of the dynamics of an autoparametric system with the spherical pendulum**  
Danuta Sado, Jan Freundlich, Anna Bobrowska  
*Warsaw University of Technology, Institute of Machine Design Fundamentals, Warsaw, Poland*

**09.30 ID 327**  
**Dynamics of a strongly nonlinear mechanical system: a case of dissipation-induced instability**  
Márcio José Horta Dantas  
*Universidade Federal de Uberlândia, Faculdade de Matemática, UFU, Uberlândia, Brazil*

**09.50 ID 381**  
**Parametrically excited inertial sensors**  
S. Amir Mousavi Lajimi, Eihab Abdel-Rahman  
*University of Waterloo, Systems Design Engineering, Waterloo, Canada*

**10.10 ID 223**  
**Homoclinic Chaos near resonances in coupled SQUID**  
Vassilios Rothos  
*Aristotle University, Thessaloniki, Greece, Department of Mechanical Engineering, Thessaloniki, Greece*

**08.30 - 10.30 MS 18 / III.**  
**Control and Synchronization in Nonlinear Systems**

**Chair:**  
Olivier Brls

**Co-chair:**  
Bob Rink

**08.30 ID 332**  
**Implicit finite element formulation of the inverse dynamics of vibrating robots**

Olivier Brls<sup>1</sup>, Arthur Lismonde<sup>1</sup>, Valentin Sonneville<sup>2</sup>

<sup>1</sup>University of Liege, Department of Aerospace and Mechanical Engineering, Liege, Belgium

<sup>2</sup>University of Maryland, Department of Aerospace Engineering, Maryland, USA

**08.50 ID 286**  
**Nonlinear normal modes of coupled van der Pol oscillators exhibiting synchronisation**

Jithin Velayudhan, Bipin Balaram

Amrita Vishwa Vidyapeetham, Department of Mechanical Engineering, Coimbatore, India

**09.10 ID 328**  
**Mixed synchronization in a triplet of coupled mechanical oscillators**

Jasper Borreman<sup>1</sup>, Henk Nijmeijer<sup>1</sup>, Joaquin Alvarez<sup>2</sup>,  
Jonatan Pena Ramirez<sup>2</sup>

<sup>1</sup>Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands

<sup>2</sup>CICESE, Department of Electronics, Ensenada, Mexico

**09.30 ID 380**  
**Synchronisation of beams attached to a rotating hub**

Zofia Szmit, Jerzy Warminski, Jaroslaw Latalski

Lublin University of Technology, Applied Mechanics, Lublin, Poland

**09.50 ID 386**  
**The emergence and breaking of synchrony in networks of dynamical systems**

Bob Rink

Vrije Universiteit Amsterdam, Department of Mathematics, Amsterdam, The Netherlands

**10.10 ID 524**  
**Role of phase synchronisation in turbulence**

Sara Moradi<sup>1</sup>, Bogdan Teaca<sup>2</sup>, Johan Anderson<sup>3</sup>

<sup>1</sup>Royal Military Academy, Laboratory for Plasma Physics -LPP-ERM/KMS, Brussels, Belgium

<sup>2</sup>Coventry University, Applied Mathematics Research Centre, Coventry, United Kingdom

<sup>3</sup>Chalmers University of Technology, Department of Earth and Space Sciences,  
Gteborg, Sweden

**TUESDAY**



**08.30 - 10.30 MS 10 / III.**  
**Non-Smooth Dynamics**

**Chair:**  
Claude-Henri Lamarque

**Co-chair:**  
Remco Ingmar Leine

**08.30 ID 42**  
**Analysis of pivoting algorithms for LCPs in redundant contact dynamics**  
Andreas Enzenhöfer<sup>1</sup>, Marek Teichmann<sup>2</sup>, József Kövecses<sup>1</sup>  
<sup>1</sup>*McGill University, Department of Mechanical Engineering, Montreal, Canada*  
<sup>2</sup>*CM Labs Simulations, Montreal, Canada*

**08.50 ID 83**  
**Comparison of Moreau-type integrators based on the time finite element discretization of the virtual action**  
Giuseppe Capobianco, Tom Winandy, Simon R. Eugster, Remco Ingmar Leine  
*University of Stuttgart, Institute for Nonlinear Mechanics, Stuttgart, Germany*

**09.10 ID 85**  
**Worst-case analysis of approximate straight-line motion mechanism with link tolerances and joint clearances**  
Narendra Akhadkar<sup>1</sup>, Vincent Acary<sup>2</sup>, Bernard Brogliato<sup>2</sup>  
<sup>1</sup>*Schneider Electric, Grenoble, France*  
<sup>2</sup>*INRIA, Grenoble, France*

**09.30 ID 205**  
**Time-stepping scheme for mechanical systems with unilateral constraints and time-delays**  
Benjamin Biemond<sup>1</sup>, Wim Michiels<sup>2</sup>  
<sup>1</sup>*Netherlands Organization for Applied Scientific Research, Department of Optomechatronics, Delft, The Netherlands*  
<sup>2</sup>*KU Leuven, Department of Computer Science, Heverlee, Belgium*

**09.50 ID 253**  
**Modification of Moreau-Jean's scheme for energy conservation in inelastic impact dynamics**  
Carlos Yoong<sup>1</sup>, Mathias Legrand<sup>1</sup>, Vincent Acary<sup>2</sup>  
<sup>1</sup>*McGill University, Department of Mechanical Engineering, Montreal, Canada*  
<sup>2</sup>*INRIA, Project - Team Bipop, Grenoble, France*

10.10

**ID 301**

**Impact dynamics near unilaterally constrained grazing orbits**

Stéphane Junca<sup>1</sup>, Huong Le Thi<sup>1</sup>, Mathias Legrand<sup>2</sup>,  
Anders Thorin<sup>2</sup>

<sup>1</sup>Université Côte d'Azur, Laboratoire de Mathématiques J.A. Dieudonné, Nice, France

<sup>2</sup>McGill University, Department of Mechanical Engineering, Montreal, Canada

**Room 7 (KF88)**

**08.30 - 10.30**

**MS 07 / III.**

**Dynamics and Optimization of Multibody Systems**

**Chair:**

Werner Schiehlen

**Co-chair:**

Laszlo Kovacs

**08.30**

**ID 45**

**Torsional vibration damper design using augmented  
Lagrangian particle swarm optimization**

Philipp Mall<sup>1</sup>, Alexander Fidlin<sup>2</sup>, Arne Krüger<sup>1</sup>

<sup>1</sup>Dr. Ing. h.c. F. Porsche AG, Transmission Development, Weissach, Germany

<sup>2</sup>Karlsruhe Institute of Technology, Institute of Engineering Mechanics,  
Karlsruhe, Germany

**08.50**

**ID 94**

**Dynamic topology optimization of a flexible multibody  
system described by ALE-ANCF with time-varying length**

Jialiing Sun<sup>1</sup>, Qiang Tian<sup>2</sup>, Haiyan Hu<sup>2</sup>

<sup>1</sup>Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering,  
Nanjing, China

<sup>2</sup>Beijing Institute of Technology, School of Aerospace Engineering, Beijing, China

**09.10**

**ID 107**

**Distributed adaptive synchronization control for networked  
Lagrange system with dynamic friction compensation**

Naijing Jiang, Shu Zhang, Jian Xu

Tongji University, School of Aerospace Engineering and Applied Mechanics,  
Shanghai, China

**09.30**

**ID 333**

**Control of a cart with oscillators under uncertainty**

Igor Ananevskii<sup>1</sup>, Tigran Ishkhanyan<sup>2</sup>

<sup>1</sup>Institute for Problems in Mechanics, Russian Academy of Sciences,  
Laboratory of Control of Mechanical Systems, Moscow, Russia

<sup>2</sup>Moscow Institute of Physics and Technology (MIPT), Department of Aerophysics  
and Space Research, Moscow, Russia

**TUESDAY**

09.50

**ID 460**

**Predictive control of robot manipulators with flexible joint**

Laszlo Bencsik<sup>1</sup>, Balint Bodor<sup>2</sup>

<sup>1</sup>MTA-BME Research Group on Dynamics of Machines and Vehicles, Budapest, Hungary

<sup>2</sup>Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary

10.10

**ID480**

**Inertia properties and their role in haptic rendering**

László Gőgh, Bálint Mohácsi, László Kovács, József Kövecses

McGill University, Department of Mechanical Engineering, Montreal, Canada

**Room 8 (KF82)**

08.30 - 10.30

**MS 02 / I.**

**Asymptotic Methods**

**Chair:**

Leonid Manevitch

**Co-chair:**

Roman Starosta

08.30

**ID 133**

**Non-stationary attractors in forced and damped weakly coupled pendulums**

Leonid Manevitch

Semenov Institute of Chemical Physics, Russian Academy of Sciences,

Department of Polymers and Composite Materials, Moscow, Russia

08.50

**ID 174**

**Vibrational analogue of coherent quantum Rabi oscillations in a three-body nonlinear mechanical system**

Yuriy Kosevich, Valeri Smirnov, Margarita Kovaleva,

Leonid Manevitch

Semenov Institute of Chemical Physics, Russian Academy of Sciences,

Department of Polymers and Composite Materials, Moscow, Russia

09.10

**ID 298**

**On periodic trajectories of a near-Hamiltonian autonomous dynamical system**

Liubov Klimina, Boris Lokshin, Yuri Selyutskiy

Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia

**TUESDAY**

09.30

**ID 304**

**Plane motion of the rigid body with the spring-damper suspension**

Roman Starosta<sup>1</sup>, Grażyna Sypniewska-Kamińska<sup>1</sup>,  
Jan Awrejcewicz<sup>2</sup>

<sup>1</sup>Poznan University of Technology, Institute for Applied Mechanics, Poznan, Poland

<sup>2</sup>Lodz University of Technology, Department of Automatics,

Biomechanics and Mechatronics, Lodz, Poland

09.50

**ID 470**

**Stationary and non-stationary dynamics of the parametric pendulum**

Francesco Romeo<sup>1</sup>, Leonid Manevitch<sup>2</sup>

<sup>1</sup>Sapienza University of Rome, Department of Structural and Geotechnical Engineering,  
Rome, Italy

<sup>2</sup>Semenov Institute of Chemical Physics, Russian Academy of Sciences,  
Department of Polymers and Composite Materials, Moscow, Russia

10.10

**ID 514**

**Analytical studies of a two degree-of-freedom vibro-impact system**

Pawel Fritzkowski<sup>1</sup>, Roman Starosta<sup>1</sup>, Jan Awrejcewicz<sup>2</sup>

<sup>1</sup>Poznan University of Technology, Institute of Applied Mechanics, Poznan, Poland

<sup>2</sup>Technical University of Lodz, Department of Automatics and Biomechanics, Lodz, Poland

**Room 9 (KF87)**

08.30 - 10.30

**MS 01 / I.**

**Reduced-Order Modeling and System Identification**

**Chair:**

Michael McFarland

**Co-chair:**

Huang Rui

08.30

**ID 123**

**Nonlinear reduced-order modeling for controlled aeroelastic systems**

Huang Rui

Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering,  
Nanjing, China

08.50

**ID 529**

**Prediction of transonic Aerodynamic Forces via nonlinear reduced-order models**

Zhijun Yang, Huang Rui, Yonghui Zhao, Haiyan Hu

Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering,  
Nanjing, China

**TUESDAY**

09.10

**ID 354**

**Particle filters with nudging in multiscale chaotic systems:  
with application to the Lorenz-96 atmospheric model**

Hoong Yeong, Ryne Beeson, Navaratnam Sri Namachchivaya

*University of Illinois at Urbana-Champaign, Aerospace Engineering, Urbana, USA*

09.30

**ID 457**

**Experimental identification of an aircraft piccolo tube  
exhibiting nonsmooth nonlinearities**

Tilan Dossogne<sup>1</sup>, Maarten Schoukens<sup>2</sup>, Bruno Bernay<sup>3</sup>,  
Jean-Philippe Noel<sup>1</sup>, Gaetan Kerschen<sup>1</sup>

<sup>1</sup>*University of Liege, Aerospace and Mechanical Engineering, Liege, Belgium*

<sup>2</sup>*Vrije Universiteit Brussel, Department ELEC, Brussels, Belgium*

<sup>3</sup>*SONACA SA, Icing and Dynamic Simulation, Gosselies, Belgium*

09.50

**ID 490**

**Model reduction for mercury porosimetry:  
invasion percolation on regular, exotic and random networks**  
Bendegúz Dezső Bak

*Budapest University of Technology and Economics, Department of Fluid Mechanics,  
Budapest, Hungary*

10.30 - 11.00

**Coffee break**

**Room 1 (KF51)**

11.00 - 12.00

**Keynote lecture**

**Autonomous assembly of a team of flexible spacecraft**  
Haiyan Hu

*School of Aerospace Engineering, Beijing Institute of Technology, Beijing, China*

12.00 - 13.30

**Lunch break**

**Room 1 (KF51)**

13.30 - 15.30

**MS 09 / IV.**

**Nonlinear Dynamics in Engineering Systems**

**Chair:**

Yuri Vladimirovich Mikhlin

**Co-chair:**

Katica Hedrih

**TUESDAY**

13.30

**ID 158**

**Dynamics of ball bearings with damages at outer raceway surface - vibration response under different loads**

Ivana Atanasovska<sup>1</sup>, Natasa Soldat<sup>2</sup>

<sup>1</sup>Mathematical Institute of Serbian Academy of Sciences and Arts,  
Department of Mechanics, Belgrade, Serbia

<sup>2</sup>University of Belgrade - Faculty of Mechanical Engineering,  
Machine Design Department, Belgrade, Serbia

13.50

**ID 265**

**Nonlinear rotordynamic-thermal analysis of micro gas turbines**

Frans Duijnhouwer, Rob Fey, Henk Nijmeijer

Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands

14.10

**ID 281**

**Torsional vibrations in truck powertrains with dual mass flywheel having piecewise linear stiffness**

Lina Wramner

Chalmers University of Technology, Applied Mechanics, Gothenburg, Sweden

14.30

**ID 308**

**Non-linear dynamics of a rotor system with compliant seal**

Simon Baeuerle, H. Hetzler

University of Kassel, Engineering Dynamics Group, Kassel, Germany

14.50

**ID 342**

**Non-linear dynamics of a heavy mass particle and rolling ball along curvilinear trace of series of circle arcs:**

**Phase trajectory portraits, some analogies and vibro-impacts**

Katica Hedrih (Stevanovic)

Mathematical Institute of Serbian Academy of Sciences and Arts,  
Department of Mechanics, Belgrade, Serbia

15.10

**ID 22**

**Evaluating nonlinear responses of asphalt concrete mixtures under time-dependent loading: in view of three representation functions**

Chun-Hsing Ho, Cristina Pilar Martin Linares

Northern Arizona University, Department of Civil and Environmental Engineering,  
Flagstaff, USA

**13.30 - 15.30 MS 11 / IV.**  
**Systems with Time Delay**

**Chair:**  
Zaihua Wang

**Co-chair:**  
Tamas Insperger

**13.30 ID 201**  
**Stochastic sensitivity in dynamic bifurcations with delayed feedback revealed through multiple scales analysis**  
Rachel Kuske  
*Georgia Institute of Technology, Department of Mathematics, Atlanta, USA*

**13.50 ID 98**  
**Delayed random relays**  
Koki Shugishita, Toru Ohira  
*Nagoya University, Graduate School of Mathematics, Nagoya, Japan*

**14.10 ID 4**  
**On some extension of center manifold method**  
Pavel Nesterov  
*Yaroslavl State University, Department of Mathematics, Yaroslavl, Russia*

**14.30 ID 276**  
**Switching to nonhyperbolic cycles from codim-2 bifurcations of equilibria in DDEs**  
Maikel Bosschaert<sup>1</sup>, Yuri Kuznetsov<sup>2</sup>  
<sup>1</sup>*Hasselt University, Applied Mechanics, Hasselt, Belgium*  
<sup>2</sup>*University of Utrecht, Mathematical Department, Utrecht, The Netherlands*

**14.50 ID 477**  
**Non-smooth torus to identify domain of attraction of stable milling processes**  
Zoltan Dombovari<sup>1</sup>, Jokin Munoa<sup>2</sup>, Rachel Kuske<sup>3</sup>, Gabor Stepan<sup>1</sup>  
<sup>1</sup>*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*  
<sup>2</sup>*IK4 Ideko Research Alliance, Dynamics and Control, Elgoibar, Spain*  
<sup>3</sup>*Georgia Institute of Technology, School of Mathematics, Atlanta, USA*

**13.30 - 15.30 MS 03 / IV.**  
**Computational Methods**

**Chair:**  
Jan Sieber

**Co-chair:**  
Mattia Serra

**13.30 ID 40**  
**Numerical study on the waveform evolution in metal material**  
Lan Wei, Xin Yu, Miao Zheng, YuXia Liu  
*Institute of Applied Physics and Computational Mathematics, Beijing, China*

**13.50 ID 194**  
**Cylindrical cavity evolution in a plane parallel potential flow of the perfect incompressible fluid**  
Nikita Baykov<sup>1</sup>, Alexander Petrov<sup>2</sup>  
<sup>1</sup>*Lomonosov Moscow State University, Department of Mathematics and Mechanics, Moscow, Russia*  
<sup>2</sup>*Ishlinsky Institute for Problems in Mechanics RAS, Mechanics of Systems, Moscow, Russia*

**14.10 ID 216**  
**Lagrangian and Eulerian coherent structures in complex dynamical systems**  
Mattia Serra, George Haller  
*ETH Zürich, Department of Mechanical Engineering, Zürich, Switzerland*

**14.30 ID 241**  
**Recent advances in the theory of Lagrangian coherent structures for three-dimensional flows**  
David Oettinger, George Haller  
*ETH Zürich, Department of Mechanical and Process Engineering, Zürich, Switzerland*

**14.50 ID 326**  
**Analysis of coupled finite-volume/Monte-Carlo methods for plasma edge simulation in fusion reactors**  
Giovanni Samaey<sup>1</sup>, Matthias Baeten<sup>1</sup>, Bert Mortier<sup>1</sup>, Tine Baelmans<sup>1,2</sup>  
<sup>1</sup>*KU Leuven, Department of Computer Science, Leuven, Belgium*  
<sup>2</sup>*KU Leuven, Department of Mechanical Engineering, Leuven, Belgium*

**15.10 ID 367**  
**Extraction and prediction of coherent patterns in incompressible flows through space-time Koopman analysis**  
Dimitrios Giannakis  
*New York University, Courant Institute of Mathematical Sciences, New York, USA*



**13.30 - 15.30 MS 08 / IV.**  
**Nonlinear Phenomena in Mechanical and Structural Systems**

**Chair:**

Bala Balachandran

**Co-chair:**

Sotirios Natsiavas

**13.30**

**ID 371**

**Experimental studies with drill string: effects of drill mud**

Meryem Kanzari<sup>1</sup>, Mohammed Yousef Alqaradawi<sup>1</sup>,  
Balakumar Balachandran<sup>2</sup>

<sup>1</sup>*Qatar University, Mechanical Engineering, Doha, Qatar*

<sup>2</sup>*University of Maryland, Mechanical Engineering, Maryland, USA*

**13.50**

**ID 414**

**Experimental and numerical study of nonlinear galloping  
oscillations interfering with vortex-induced excitation**

Claudio Mannini, Tommaso Massai, Antonino Maria Marra

*University of Florence, Department of Civil and Environmental Engineering, Florence, Italy*

**14.10**

**ID 148**

**Nonlinear dynamics analysis of a rotor-damper system  
through nonlinear Galerkin method on approximate inertial  
manifold**

Yuefang Wang<sup>1</sup>, Jin Huang<sup>1</sup>, Lihua Huang<sup>2</sup>

<sup>1</sup>*Dalian University of Technology, Department of Engineering Mechanics, Dalian, China*

<sup>2</sup>*Dalian University of Technology, Faculty of Infrastructural Engineering, Dalian, China*

**14.30**

**ID 249**

**Nonlinear electromechanical interactions in rotordynamics  
of electrical machines**

Felix Boy, Hartmut Hetzler

*University of Kassel, Mechanical Engineering, Kassel, Germany*

**14.50**

**ID 442**

**Effect of softening constitutive law on column buckling**

Soheil Fatehiboroujeni, Derek Hollenbeck, Sachin Goyal

*University of California, Merced, Department of Mechanical Engineering, Merced, USA*

**15.10**

**ID 405**

**Finding periodic solutions in the dynamics of metal cutting  
via averaging**

Tamás Gábor Molnár, Tamás Insperger, Gábor Stépan

*Budapest University of Technology and Economics, Department of Applied Mechanics,  
Budapest, Hungary*

**13.30 - 15.30 MS 18 / IV.**  
**Control and Synchronization in Nonlinear Systems**

**Chair:**  
Nathan van de Wouw

**Co-chair:**  
Elena Panteley

**13.30 ID 101**  
**Effects of an external parameter on the synchronization threshold of time-delayed Hindmarsh-Rose neurons**  
Isaac Topiltzin, Castanedo Guerra

*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

**13.50 ID 190**  
**Tweezer control for chimera states in small networks**  
Iryna Omelchenko<sup>1</sup>, Oleh E. Omel'chenko<sup>2</sup>,  
Anna Zakharova<sup>1</sup>, Matthias Wolfrum<sup>2</sup>, Eckehard Schöll<sup>1</sup>  
<sup>1</sup>Technische Universität Berlin, Institut für Theoretische Physik, Berlin, Germany  
<sup>2</sup>Weierstrass Institute, Berlin, Germany

**14.10 ID 193**  
**Computing partial synchronization manifolds of delay-coupled systems**  
Wim Michiels<sup>1</sup>, Libo Su<sup>1</sup>, Erik Steur<sup>2</sup>, Henk Nijmeijer<sup>3</sup>  
<sup>1</sup>KU Leuven, Department of Computer Science, Heverlee, Belgium  
<sup>2</sup>Eindhoven University of Technology, Institute of Complex and Molecular Systems,  
Eindhoven, The Netherlands  
<sup>3</sup>Eindhoven University of Technology, Mechanical Engineering,  
Eindhoven, The Netherlands

**14.30 ID 255**  
**Beyond complete synchronization of identical systems: multidimensional dynamic consensus**  
Elena Panteley, Antonio Loria  
*L2S (Laboratoire des signaux et systèmes), CNRS (Centre national de la recherche scientifique), CentraleSupélec, Gif sur Yvette, France*

**14.50 ID 359**  
**Delay-independent partial synchronization in networks of non-identical nonlinear systems with transmission delay coupling**  
Toshiki Oguchi, Manabu Suzuki, Daisuke Yanagi  
*Tokyo Metropolitan University, Department of Mechanical Engineering, Tokyo, Japan*

15.10

**ID 120**

**Analysis of synchronization in mutually coupled MEMS oscillators via surface acoustic waves using a simplified non-linear model**

Mohana Das Govind, Manoj Pandey

*Indian Institute of Technology Madras, Department of Mechanical Engineering, Chennai, India*

**Room 6 (KF81)**

**13.30 - 15.30**

**MS 10 / IV.**

**Non-Smooth Dynamics**

**Chair:**

Remco Ingmar Leine

**Co-chair:**

Vincent Acary

**13.30**

**ID 156**

**Low-dimensional piecewise smooth maps with an unpredictable number of switching manifolds**

Viktor Avrutin<sup>1</sup>, Zhanybai T. Zhusubaliyev<sup>2</sup>, Erik Mosekilde<sup>3</sup>

<sup>1</sup>*University of Stuttgart, Institute for Systems Theory and Automatic Control, Stuttgart, Germany*

<sup>2</sup>*Southwest State University, Department of Computer Science, Kursk, Russia*

<sup>3</sup>*Technical University of Denmark, Department of Physics, Lyngby, Denmark*

**13.50**

**ID 164**

**Lyapunov stability and existence results of measure differential inclusions - applications in nonsmooth mechanics with singular mass matrices**

Manuela Paschowski

*Martin Luther University Halle-Wittenberg, Institute for Mathematics, Halle, Germany*

**14.10**

**ID 178**

**A solution of the general single contact frictionless problem using tools of b-geometry**

Sotirios Natsiavas<sup>1</sup>, Elias Paraskevopoulos<sup>2</sup>

<sup>1</sup>*Aristotle University, Faculty of Mechanical Engineering, Thessaloniki, Greece*

<sup>2</sup>*Aristotle University, Department of Mechanical Engineering, Thessaloniki, Greece*

**14.30**

**ID 273**

**Spectrum of an impact oscillator via nonsmooth modal analysis**

Anders Thorin, Mathias Legrand

*McGill University, Mechanical Engineering, Montreal, Canada*

**TUESDAY**

14.50

**ID 292**

**Comparison between piecewise linear and smooth dynamics:  
A case study of decomposing a degenerate bifurcation**

Barnabas M. Garay, Miklós Koller, Marcell Simkó

*Pazmany Peter Catholic University, Faculty of Information Technology and Bionics,  
Budapest, Hungary*

15.10

**ID 296**

**Fluid-structure interaction simulations of heart valves  
with dynamic contact**

Maria Giuseppina Chiara Nestola, Patrick Zulian, Rolf Krause

*Università della Svizzera Italiana, Institute of Computational Science, Lugano, Switzerland*

**Room 7 (KF88)**

13.30 - 15.30

**MS 13 / I.**

**Nonlinear Dynamics in Biological Systems**

**Chair:**

Gergely Röst

**Co-chair:**

Jüri Engelbrecht

13.30

**ID 14**

**Waves in biomembranes with amplitude-dependent  
nonlinearities**

Jüri Engelbrecht, Tanel Peets, Kert Tamm

*Tallinn University of Technology, Institute of Cybernetics, Tallinn, Estonia*

13.50

**ID 52**

**An influence of nonlinearity and discontinuity on sound  
transfer in reconstructed middle ear**

Rafal Rusinek

*Lublin University of Technology, Department of Applied Mechanics, Lublin, Poland*

14.10

**ID 128**

**Monomolecular reaction networks: flux-influenced sets  
and balloons**

Nicola Vassena<sup>1</sup>, Hiroshi Matano<sup>2</sup>

<sup>1</sup>*Free University Berlin, Department of Mathematics, Berlin, Germany*

<sup>2</sup>*University of Tokyo, Department of Mathematics, Tokyo, Japan*

14.30

**ID 313**

**Modeling of controllable support stiffness bio-inspired  
by tactile sensor systems**

Carsten Behn, Moritz Scharff, Thomas Helbig, Danja Voges,  
Hartmut Witte, Joachim Steigenberger

*Technische Universität Ilmenau, Department of Mechanical Engineering,  
Ilmenau, Germany*

**TUESDAY**

14.50

**ID 372**

**Analysis of oscillatory motions of chromosomes during anaphase using biomechanical oscillatory model of mitotic spindle**

Andjelka Hedrih<sup>1</sup>, Katica (Stevanović) Hedrih<sup>1,2</sup>

<sup>1</sup>*Mathematical Institute of Serbian Academy of Sciences and Arts,  
Department of Mechanics, Belgrade, Serbia*

<sup>2</sup>*Faculty of Mechanical Engineering, University of Nis, Nis, Serbia*

15.10

**ID 418**

**Dynamics of statically pre-loaded human aorta with residual stresses**

Marco Amabili

*McGill University, Mechanical Engineering, Montreal, Canada*

**Room 8 (KF82)**

13.30 - 15.30

**MS 02 / II.**

**Asymptotic Methods**

**Chair:**

Jan Awrejcewicz

**Co-chair:**

Wim T. Van Horssen

13.30

**ID 19**

**On perturbations methods and their applicability in the study of vibrations of axially moving strings and beams**

Wim T. Van Horssen

*Delft University of Technology, Delft Institute of Applied Mathematics,  
Delft, The Netherlands*

13.50

**ID 99**

**On the mathematical justification of viscoelastic shell models**

Gonzalo Castiñeira Veiga<sup>1</sup>, Ángel Rodríguez-Arós<sup>2</sup>

<sup>1</sup>*Universidade de Santiago de Compostela, Department of Applied Mathematics,  
Santiago de Compostela, Spain*

<sup>2</sup>*Universidade da Coruña, Department of Mathematics, A Coruña, Spain*

14.10

**ID 152**

**Internal resonances of a non-linear heterogeneous rod: influence of dispersion and dissipation**

Igor Andrianov<sup>1</sup>, Vladyslav Danishevskyy<sup>2</sup>, Bernd Markert<sup>1</sup>,  
Graham Rogerson<sup>2</sup>

<sup>1</sup>*RWTH Aachen University, Institute of General Mechanics, Aachen, Germany*

<sup>2</sup>*Keele University, School of Computing and Mathematics, Keele, United Kingdom*

**TUESDAY**

14.30

**ID 256**

**On time-varying velocity for an axially moving string under viscous damping**

Sajad H. Sandilo

*Quaid-e-Awam University of Engineering, Science and Technology,  
Department of Mathematics, Nawabshah, Pakistan*

14.50

**ID 428**

**Small-scale counter-rotating Darrieus wind turbine**

Liubov Klimina<sup>1</sup>, Ekaterina Shalimova<sup>1</sup>, Vitaly Samsonov<sup>1</sup>,  
Ching-Huei Lin<sup>2</sup>

<sup>1</sup>*Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia*

<sup>2</sup>*Chien Hsin University of Science and Technology, Electrical Engineering, Moscow, Russia*

15.10

**ID 444**

**Semi-analytical investigation of unsteady free-boundary flows**

Evqenii Karabut<sup>1</sup>, Aleksander Petrov<sup>2</sup>, Elena Zhuravleva<sup>3</sup>

<sup>1</sup>*Lavrentyev Institute of Hydrodynamics, Russian Academy of Sciences,  
Novosibirsk, Russia*

<sup>2</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences,  
Russian Academy of Sciences, Moscow, Russia*

<sup>3</sup>*Lavrentyev Institute of Hydrodynamics, Applied Mathematics, Novosibirsk, Russia*

**Room 9 (KF87)**

13.30 - 15.30

**MS 01 / II.**

**Reduced-Order Modeling and System Identification**

**Chair:**

Michael McFarland

**Co-chair:**

Dennis Grunert

13.30

**ID 244**

**Towards the adoption of the stiffness evaluation procedure as non-intrusive, non-linear model reduction method in car crash simulations**

Dennis Grunert, Jörg Fehr

*University of Stuttgart, Institute of Engineering and Computational Mechanics,  
Stuttgart, Germany*

13.50

**ID 275**

**Experimental frequency response synthesis for nonlinear systems**

Simon Peter<sup>1</sup>, Maren Scheel<sup>2</sup>, Malte Krack<sup>2</sup>, Remco Ingmar Leine<sup>1</sup>

<sup>1</sup>*University of Stuttgart, Institute for Nonlinear Mechanics, Stuttgart, Germany*

<sup>2</sup>*University of Stuttgart, Institute of Aircraft Propulsion Systems, Stuttgart, Germany*

**TUESDAY**

14.10

**ID 280**

**Towards experimental nonlinear modal analysis of systems with nonlinear damping**

Maren Scheel<sup>1</sup>, Simon Peter<sup>2</sup>, Remco Ingmar Leine<sup>2</sup>, Malte Krack<sup>1</sup>

<sup>1</sup>University of Stuttgart, Institute of Aircraft Propulsion Systems, Stuttgart, Germany

<sup>2</sup>University of Stuttgart, Institute for Nonlinear Mechanics, Stuttgart, Germany

15.30 - 16.00

**Coffee break**

**Room 1 (KF51)**

16.00 - 18.00

**MS 09 / V.**

**Nonlinear Dynamics in Engineering Systems**

**Chair:**

Katica Hedrih

**Co-chair:**

Antonio Papangelo

16.00

**ID 46**

**Vibration localization and snaking bifurcations in a purely mechanical system**

Antonio Papangelo<sup>1</sup>, Aurelien Grolet<sup>2</sup>, Norbert Hoffmann<sup>1,4</sup>, Michele Ciavarella<sup>3</sup>

<sup>1</sup>Hamburg University of Technology, Mechanical Engineering Department, Hamburg, Germany

<sup>2</sup>ENSAM, Department of Mechanics, Lille, France

<sup>3</sup>Polytechnic of Bari, Mechanical Engineering Department, Bari, Italy

<sup>4</sup>Imperial College London, Department of Mechanical Engineering, London, United Kingdom

16.20

**ID 168**

**Study on the nonlinear model reduction of the flexible multibody system described by the spatial gradient-deficient beam element of ANCF**

Yixuan Tang

Nanjing University of Aeronautics and Astronautics, School of Aeronautics and Astronautics, Nanjing, China

**TUESDAY**

16.40

**ID 218**

**Nonlinear phenomena in AFM arrays**

Samuel Jackson, Stefanie Gutschmidt

*University of Canterbury, Department of Mechanical Engineering,  
Christchurch, New Zealand*

17.00

**ID 312**

**Saturated adaptive control of muscle-like compliant manipulation systems**

Carsten Behn, Konrad Siedler

*Technische Universität Ilmenau, Department of Mechanical Engineering, Ilmenau, Germany*

17.20

**ID 388**

**Power flow of nonlinear vibration isolation with high-static-low-dynamic stiffness**

Zeqi Lu<sup>1</sup>, Li-Qun Chen<sup>2</sup>

<sup>1</sup>*Shanghai University, Shanghai Institute of Applied Mathematics and Mechanics, Shanghai, China*

<sup>2</sup>*Shanghai University, Department of Mechanics, Shanghai, China*

**Room 2 (K174)**

16.00 - 18.00

**MS 11 / V.**

**Systems with Time Delay**

**Chair:**

Eric Butcher

**Co-chair:**

Zaihua Wang

16.00

**ID 84**

**Stability of time-delay systems: from integer-order to fractional-order systems**

Zaihua Wang

*Nanjing University of Aeronautics and Astronautics, State Key Lab of Mechanics and Control of Mechanical Structures, Nanjing, China*

16.20

**ID 510**

**Intermittent delay feedback control as an origin of physiological movement variability**

Taishin Nomura<sup>1</sup>, Yasuyuki Suzuki<sup>1</sup>, Ken Kiyono<sup>1</sup>, Pietro Morasso<sup>2</sup>

<sup>1</sup>*Osaka University, Graduate School of Engineering Science, Osaka, Japan*

<sup>2</sup>*Italian Institute of Technology, Genova, Italy*

16.40

**ID 426**

**Delayed tyre model in vehicle shimmy**

Tian Mi

*Southeast University, School of Mechanical Engineering, Nanjing, China*

**TUESDAY**



17.00

**ID 430**

**Balancing on accelerating skateboard**

Balazs Varszegi<sup>1</sup>, Denes Takacs<sup>2</sup>, Tamas Insperger<sup>1</sup>

<sup>1</sup>*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

<sup>2</sup>*MTA-BME Research Group on Dynamics of Machines and Vehicles, Budapest, Hungary*

17.20

**ID 462**

**Hopf bifurcation in a nonlinear mechanical model of human balancing with delayed PDA control**

Li Zhang

*Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering, Nanjing, China*

17.40

**ID 500**

**Solution of scale dynamic systems**

Aftab Ahmed, Erik Verriest

*Georgia Institute of Technology, Electrical and Computer Engineering, Atlanta, USA*

**Room 3 (K155)**

16.00 - 18.00

**MS 03 / V.**

**Computational Methods**

**Chair:**

Themistoklis Sapsis

**Co-chair:**

Claudia Wulff

16.00

**ID 7**

**An asymptotic-preserving stochastic Galerkin method for the semiconductor Boltzmann equation with random inputs and diffusive scalings**

Liu Liu, Shi Jin

*University of Wisconsin-Madison, Department of Mathematics, Madison, USA*

16.20

**ID 61**

**Fractional order convergence of time-discretizations for semilinear PDEs**

Claudia Wulff

*University of Surrey, Department of Mathematics, Guildford, United Kingdom*

16.40

**ID 90**

**Combined error estimates for numerical continuation of stochastic systems**

Christian Kuehn

*Technical University of Munich, Department of Mathematics, Muenchen, Germany*

**TUESDAY**

- 17.00 ID 357**  
**Path-based measures of transport and expansion rates in stochastic flows**  
 Michal Branicki, Kenneth Uda  
*University of Edinburgh, Department of Mathematics, Edinburgh, United Kingdom*
- 17.20 ID 360**  
**Probabilistic quantification of extreme events in complex systems**  
 Themistoklis Sapsis, Mustafa Mohamad  
*Massachusetts Institute of Technology, Mechanical Engineering, Cambridge, USA*
- 17.40 ID 453**  
**Set oriented numerical methods for spatially dependent parameter uncertainty**  
 Michael Dellnitz, Adrian Ziessler  
*University of Paderborn, Department of Mathematics, Paderborn, Germany*

#### Room 4 (K134)

- 16.00 - 18.00 MS 08 / V.**  
**Nonlinear Phenomena in Mechanical and Structural Systems**
- Chair:** Sotirios Natsiavas      **Co-chair:** Jerzy Warmański
- 16.00 ID 449**  
**Perturbation analysis on the dynamic behaviours of planetary gear sets with friction**  
 Chao Xun, Xinhua Long  
*Institute of Vibration, Noise and Shock, School of Mechanical Engineering, Shanghai, China*
- 16.20 ID 422**  
**Passive/active thermal dynamics in the coupled nonlinear vibrations of laminated plates**  
 Valeria Settini, Eduardo Saetta, Giuseppe Rega  
*Sapienza University of Rome, Department of Structural and Geotechnical Engineering, Rome, Italy*
- 16.40 ID 436**  
**Dynamics and fracture of impacted sandwich composites under time varying loads: Numerical modelling and simulations**  
 Vyacheslav Burlayenko  
*National Technical University "KhPI", Applied Mathematics, Kharkov, Ukraine*

17.00

**ID 448**

**Wrinkling patterns of thin films under finite membrane strain**

Eszter Fehér, András Árpád Sipos

*Budapest University of Technology and Economics, Department of Mechanics,  
Materials and Structures, Budapest, Hungary*

17.20

**ID 459**

**Nonlinear material modelling of an airsoft pellet applied for impulse excitation**

Szabolcs Berezvai, Attila Kossa, Gabor Stepan

*Budapest University of Technology and Economics, Department of Applied Mechanics,  
Budapest, Hungary*

17.40

**ID 237**

**Fatigue behavior of heat-damaged and FRP repaired beams**

Rami Haddad, Yasmeen Obaidat

*Jordan University of Science and Technology, Department of Civil Engineering,  
Irbid, Jordan*

**Room 5 (K150)**

16.00 - 18.00

**MS 18 / V.**

**Control and Synchronization in Nonlinear Systems**

**Chair:**

Bernard Brogliato

**Co-chair:**

R.H.B. Fey

16.00

**ID 76**

**Switching between coexisting stable periodic solutions by impulsive forces with an application to a vibrating plate**

D.W.M. Veldman, R.H.B. Fey, H.J. Zwart

*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

16.20

**ID 165**

**A robust-tube MPC approach for the analysis of load response of power plants**

Istvan Selek, Jeno Kovacs

*University of Oulu, Finland, Systems Engineering Research Group, Oulu, Finland*

16.40

**ID 183**

**Nonlinear control and stability analysis of a stroke limited inertial actuator in velocity feedback**

Mattia Dal Borgo, Maryam Ghandchi Tehrani,  
Stephen John Elliott

*University of Southampton, Institute of Sound and Vibration Research,  
Southampton, United Kingdom*

**TUESDAY**

17.00

**ID 232**

**Dynamic data-driven adaptive observations in a vortex flowfield**

Ryne Beeson, Hoong Chieh Yeong, Navaratnam Sri Namachchivaya  
*University of Illinois at Urbana-Champaign, Department of Aerospace Engineering, Urbana, USA*

17.20

**ID 288**

**Low-pass filter with hybrid integrator-gain switching for increased bandwidth**

Marcel Heertjes  
*Eindhoven University of Technology, Department of Mechanical Engineering, Eindhoven, The Netherlands*

17.40

**ID 401**

**Modelling and control of a simplified system under external disturbance**

Gangsig Shin  
*KINS, Dept of safety research, Daejeon, South Korea*

**Room 6 (KF81)**

16.00 - 18.00

**MS 16 / I.**

**Random Dynamical Systems - Recent Advances and New Directions**

**Chair:**

Rachel Kuske

**Co-chair:**

Daniil Yurchenko

16.00

**ID 66**

**Evolutionary dynamics of membership distribution functions of a forced triple well potential system with fuzzy uncertainty**

Ling Hong  
*Xi'an Jiaotong University, State Key Lab for Strength and Vibration, Xi'an, China*

16.20

**ID 169**

**Energy conversion in a dynamic vibro-impact system with dielectric elastomers**

Gordon Thomson, Daniil Yurchenko  
*Heriot-Watt University, Institute of Mechanical, Process and Energy Engineering, Edinburgh, United Kingdom*

16.40

**ID 419**

**Nonlinear random vibrations of stretched beam discretized by finite difference scheme and excited by Gaussian white noise**

Guo-Kang Er  
*University of Macau, Department of Civil and Environmental Engineering, Macau SAR, China*

**TUESDAY**

17.00

**ID 429**

**Approximation of top Lyapunov exponent of stochastic delayed turning model using Fokker-Planck approach**

Henrik Tamas Sykora<sup>1</sup>, Walter V. Wedig<sup>2</sup>, Daniel Bachrathy<sup>1</sup>, Gabor Stepan<sup>1</sup>

<sup>1</sup>*Budapest University of Technology and Economics, Applied mechanics, Budapest, Hungary*

<sup>2</sup>*Karlsruhe Institute of Technology, Institute for Applied Mechanics, Karlsruhe, Germany*

17.20

**ID 177**

**Statistics of the response of a dry-friction oscillator stochastically excited**

Roberta Lima, Rubens Sampaio

*Pontifícia Universidade Católica do Rio de Janeiro, Departamento de Engenharia Mecânica, Rio de Janeiro, Brazil*

**Room 7 (KF88)**

16.00 - 18.00

**MS 13 / II.**

**Nonlinear Dynamics in Biological Systems**

**Chair:**

Sachin Goyal

**Co-chair:**

John Milton

16.00

**ID 35**

**Izhikevich neural networking model; Master neurons & slave neurons and applications in modeling Alzheimer's disease; Delay in the signal and eventually periodic solutions**

Maksims Zigunovs<sup>1,4</sup>, Michael Radin<sup>2</sup>, Alexander Pisarchik<sup>3</sup>

<sup>1</sup>*Riga Technical University, Institute of Applied Mathematics, Faculty of Computer Science and Information Technology, Riga, Latvia*

<sup>2</sup>*Rochester Institute of Technology, Department of Applied mathematics, Rochester, New York, USA*

<sup>3</sup>*Madrid Technical University, Center of Biomedical Technology, Madrid, Spain*

<sup>4</sup>*Liepaja University, Institute of Science and Innovative Technologies, Faculty of Science and Engineering, Liepaja, Latvia*

16.20

**ID 408**

**Expert stick balancing:  
Levy distributions and the edge of stability**

John Milton

*The Claremont Colleges, W M Keck Science Department, Claremont, USA*

**TUESDAY**

16.40

**ID 411**

**Three-segmented hopping leg for the analysis of human running locomotion**

László Fekete<sup>1</sup>, Bernd Krauskopf<sup>2</sup>, Ambrus Zelei<sup>3</sup>

<sup>1</sup>Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary

<sup>2</sup>The University of Auckland, Department of Mathematics, Auckland, New Zealand

<sup>3</sup>MTA-BME Research Group on Dynamics of Machines and Vehicles, Budapest, Hungary

17.00

**ID 481**

**Proper orthogonal decomposition analysis of impact-induced dynamics of the olive tree branch: a paradigm of a complex soft-stiff structure in biomechanics**

Ioannis Georgiou

National Technical University of Athens, School of Naval Architecture and Marine Engineering, Athens, Greece

17.20

**ID 505**

**The role of vibrations in tactile perception**

Marco Barbieri, Ramona Fagiani

University of Modena and Reggio Emilia, Department of Engineering Enzo Ferrari, Modena, Italy

17.40

**ID 3**

**Periodic orbits of a neuron model with periodic internal decay rate**

Michael Radin

Rochester Institute of Technology, School of Mathematical Sciences, Rochester, New York, USA

**Room 8 (KF82)**

16.00 - 18.00

**MS 02 / III.**

**Asymptotic Methods**

**Chair:**

Igor V. Andrianov

**Co-chair:**

Alexey Porubov

16.00

**ID 198**

**Control of nonlinear localized waves by an external action**

Alexey Porubov

Institute of Problems of Mechanical Engineering, Department of Micromechanics of Materials, Saint Petersburg, Russia

**TUESDAY**

- 16.20** **ID 197**  
**Forced resonance vibrations of the dissipative spring-pendulum system**  
 Yuri Vladimirovich Mikhlin  
*National Technical University "KhPI", Applied Mathematics, Kharkov, Ukraine*
- 16.40** **ID 343**  
**Energy method applied to the asymptotic methods of non-linear mechanics**  
 Katica Hedrih (Stevanovic)  
*Mathematical Institute of Serbian Academy of Sciences and Arts,  
 Department of Mechanics, Belgrade, Serbia*
- 17.00** **ID 424**  
**Energy transport and localization in the system of harmonically coupled pendulums**  
 Margarita Kovaleva, Valeri Smirnov, Leonid Manevitch  
*Semenov Institute of Chemical Physics, Russian Academy of Sciences,  
 Department of Polymers and Composite Materials, Moscow, Russia*
- 17.20** **ID 489**  
**2D control of energy transport in the locally resonant unit cell model with self excitation**  
 Margarita Kovaleva<sup>1</sup>, Nina Ryazan<sup>2</sup>, Yuli Starosvetsky<sup>2</sup>  
<sup>1</sup>*Semenov Institute of Chemical Physics, Russian Academy of Sciences,  
 Department of Polymers and Composite Materials, Moscow, Russia*  
<sup>2</sup>*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*
- 17.40** **ID 6**  
**Stochastic Asymptotic-preserving Galerkin methods for multiscale kinetic equations with uncertainties**  
 Shi Jin  
*Institute of Natural Sciences, Shanghai Jiao Tong University, China and Department  
 of Mathematics, University of Wisconsin, Madison, USA*

**16.00 - 18.00 MS 01 / III.**  
**Reduced-Order Modeling and System Identification**

**Chair:**  
Michael McFarland

**Co-chair:**  
Li-Qun Chen

**16.00 ID 65**  
**Reduced-order modeling of strongly nonlinear systems using measured time series**

Keegan Moore<sup>1</sup>, Christopher Herrera<sup>2</sup>, Mehmet Kurt<sup>3</sup>,  
Melih Eriten<sup>4</sup>, Michael McFarland<sup>2</sup>, Lawrence Bergman<sup>2</sup>,  
Alexander Vakakis<sup>1</sup>

<sup>1</sup>University of Illinois at Urbana-Champaign, Department of Mechanical Science  
and Engineering, Champaign, USA

<sup>2</sup>University of Illinois at Urbana-Champaign, Department of Aerospace Engineering,  
Champaign, USA

<sup>3</sup>Stanford University, Department of Bioengineering, Stanford, USA

<sup>4</sup>University of Wisconsin-Madison, Department of Mechanical Engineering, Madison, USA

**16.20 ID 129**  
**Applications of spectral submanifolds in nonlinear modal analysis**

Sten Ponsioen, George Haller

*ETH Zürich, Institute for Mechanical Systems, Zürich, Switzerland*

**16.40 ID 400**  
**Nonparametric identification of a nonlinear piezoelectric vibration energy harvester**

Li-Qun Chen<sup>1</sup>, Tianchen Yuan Yuan<sup>2</sup>

<sup>1</sup>Shanghai University, Department of Mechanics, Shanghai, China

<sup>2</sup>Shanghai University, Shanghai Institute of Applied Mathematics and Mechanics,  
Shanghai, China

**17.00 ID 443**  
**Parameter estimation for nonsymmetric matrix Riccati differential equations**

David Swigon

*University of Pittsburgh, Department of Mathematics, Pittsburgh, USA*

**17.20 ID 530**  
**Linearizability condition of nonlinear form of Riccati equation**

Ruma Dutta

*Ohio State University, Applied Mathematics, Columbus, USA*



## Room 1 (KF51)

### 08.30 - 10.30 **MS 09 / VI.** **Nonlinear Dynamics in Engineering Systems**

**Chair:**  
Marco Amabili

**Co-chair:**  
Jun Jiang

#### 08.30 **ID 396** **Analysis of a remarkable singularity in a nonlinear DDE**

Matthew Davidow<sup>1</sup>, B Shayak<sup>2</sup>, Richard Rand<sup>3</sup>

<sup>1</sup>*Cornell University, Center for Applied Mathematics, Ithaca, USA*

<sup>2</sup>*Cornell University, School of Mechanical and Aerospace Engineering, Ithaca, USA*

<sup>3</sup>*Cornell University, Department of Mathematics and Department of Mechanical and Aerospace Engineering, Ithaca, USA*

#### 08.50 **ID 417** **Identification of nonlinear damping for large-amplitude vibrations of plates and shells**

Marco Amabili

*McGill University, Department of Mechanical Engineering, Montreal, Canada*

#### 09.10 **ID 479** **On dynamics of a particle tethered to a rigid body by two unilateral constraints**

Alexander V. Rodnikov

*Moscow Aviation Institute (National Research University), Applied Mathematics and Physics, Moscow, Russia*

#### 09.30 **ID 483** **Modelling and simulation of vibrocompaction processes** Javier González Carbajal, Daniel García-Vallejo, Jaime Domínguez

*Universidad de Sevilla, Mechanical and Manufacturing Engineering, Sevilla, Spain*

#### 09.50 **ID 497** **Observation of vibratory force phenomena**

Tadeusz Majewski

*Universidad de las Americas-Puebla, Department of Industrial and Mechanical Engineering, Puebla, Mexico*

#### 10.10 **ID 113** **Transient responses and bifurcation behavior of a piecewise smooth rotor/stator rubbing system under noise excitation** Jun Jiang

*Xi'an Jiaotong University, State Key Lab for Strength and Vibration, Xi'an, China*

**08.30 - 10.30 MS 11 / VI.**  
**Systems with Time Delay**

**Chair:**  
Tamas Insperger

**Co-chair:**  
Eric Butcher

**08.30 ID 485**  
**Borehole spiraling as limit cycle of directionally unstable drilling systems**

Julien Marck, Emmanuel Detournay

*University of Minnesota, Department of Civil, Environmental and Geo-Engineering,  
Minneapolis, USA*

**08.50 ID 330**  
**Delay system modelling and analysis of a down-hole tool in drilling systems**

Nathan Van de Wouw<sup>1,2,3</sup>, Thijs Vromen<sup>1</sup>, Emmanue Detournay<sup>2</sup>,  
Henk Nijmeijer<sup>1</sup>

<sup>1</sup>*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

<sup>2</sup>*University of Minnesota, Department of Civil, Environmental and Geo-Engineering,  
Minneapolis, USA*

<sup>3</sup>*Delft University of Technology, Delft Center for Systems and Control,  
Delft, The Netherlands*

**09.10 ID 369**  
**Post-critical vibrations in an auto-resonant axial-torsional vibratory drilling system**

Alexander Gouskov<sup>1</sup>, Mikhail Guskov<sup>2</sup>

<sup>1</sup>*Bauman Moscow State Technical University, Applied Mechanics, Moscow, Russia*

<sup>2</sup>*ENSAM, PIMM Laboratory, Paris, France*

**09.30 ID 29**  
**Axial and torsional dynamics of a distributed drill string system**  
Ulf Jakob Flø Aarsnes<sup>1</sup>, Nathan Van de Wouw<sup>2</sup>

<sup>1</sup>*International Research Institute of Stavanger, Drilling & Well Technology, Oslo, Norway*

<sup>2</sup>*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*

**09.50 ID 518**  
**Drilling dynamics under 1:1 internal resonance between axial and torsional modes**

Sunit K. Gupta, Pankaj Wahi

*Indian Institute of Technology Kanpur, Department of Mechanical Engineering,  
Kanpur, India*

WEDNESDAY

10.10

**ID 115**

**Planar motions in grinding chatter**

Yao Yan

*University of Electronic Science and Technology of China, School of Aeronautics and Astronautics, Chengdu, China*

**Room 3 (K155)**

**08.30 - 10.30**

**MS 12 / I.**

**Micro- and Nano-Electro-Mechanical Systems**

**Chair:**

Anil Bajaj

**Co-chair:**

Slava Krilov

**08.30**

**ID 25**

**Parametric amplification of acoustically-excited micromechanical oscillators using fringing electrostatic fields**

Stella Lulinsky<sup>1</sup>, Tsvi Schmilovich<sup>1</sup>, Bojan Rob Ilic<sup>2</sup>, Slava Krylov<sup>1</sup>

<sup>1</sup>*Tel Aviv University, School of Mechanical Engineering, Tel Aviv, Israel*

<sup>2</sup>*National Institute of Standards and Technology, Center for Nanoscale Science and Technology, Gaithersburg, USA*

**08.50**

**ID 358**

**Room-temperature stochastic switching in a Duffing graphene resonator**

Samer Houri, Robin Dolleman, Peter Steeneken, Herre Van der Zant

*Delft University of Technology, Kavli Institute of Nanoscience, Delft, The Netherlands*

**09.10**

**ID 365**

**The influence of imperfections on the spatio-temporal dynamics of a parametrically excited nonlinear viscoelastic micro-beam-string**

Prashant Kambali<sup>1</sup>, Karin Mora<sup>2</sup>, Oded Gottlieb<sup>1</sup>

<sup>1</sup>*Technion – Israel Institute of Technology, Mechanical Engineering, Haifa, Israel*

<sup>2</sup>*University of Paderborn, Electrical Engineering, Paderborn, Germany*

**09.30**

**ID 72**

**A degenerate mode magnetic acoustic resonator**

Barry Gallacher<sup>1</sup>, Jim Burdess<sup>1</sup>, Z Hu<sup>1</sup>, Harriet Grigg<sup>1</sup>, Carl Dale<sup>2</sup>, Chen Fu<sup>2</sup>, Neil Keegan<sup>2</sup>, John Hedley<sup>1</sup>, Julia Spoors<sup>2</sup>

<sup>1</sup>*Newcastle University, Department of Mechanical, Materials and Manufacturing Engineering, Newcastle upon Tyne, United Kingdom*

<sup>2</sup>*Newcastle University, Institute of Cellular Medicine, Newcastle upon Tyne, United Kingdom*

**WEDNESDAY**

09.50

**ID 517**

**Uncertainty quantification and response reliability for a nonlinear resonant MEMS t-beam structure undergoing 1:2 autoparametric resonance**

Anil K. Bajaj, Rajat Goyal

*Purdue University, School of Mechanical Engineering, West Lafayette, USA*

10.10

**ID 64**

**Devil's staircase in an optomechanical cavity**

Eyal Buks

*Technion – Israel Institute of Technology, Electrical Engineering, Haifa, Israel*

**Room 4 (K134)**

08.30 - 10.30

**MS 08 / VI.**

**Nonlinear Phenomena in Mechanical and Structural Systems**

**Chair:**

Jerzy Warmański

**Co-chair:**

Bala Balachandran

08.30

**ID 393**

**Uncovering detached resonance curves in single degree-of-freedom systems**

Giuseppe Habib<sup>1</sup>, Giuseppe Cirillo<sup>2</sup>, Gaetan Kerschen<sup>3</sup>

*<sup>1</sup>Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

*<sup>2</sup>University of Cambridge, Department of Engineering, Cambridge, United Kingdom*

*<sup>3</sup>University of Liege, Aerospace and Mechanical Engineering, Liege, Belgium*

08.50

**ID 239**

**Spectral submanifolds and exact model reduction for nonlinear beam dynamics**

Florian Kogelbauer, George Haller

*ETH Zürich, Department of Mechanics, Zürich, Switzerland*

09.10

**ID 325**

**Bifurcations of relative equilibria sets of a massive point on an uniformly rotating spherical asteroid**

Alexander Burov<sup>1</sup>, Ivan Kosenko<sup>2</sup>, Ekaterina Shalimova<sup>3</sup>

*<sup>1</sup>Dorodnicyn Computing Centre, Federal Research Center "Computer Science and Control" of Russian Academy of Sciences, Department of Mechanics, Moscow, Russia*

*<sup>2</sup>Lomonosov Moscow State University, Department of Theoretical Mechanics, Moscow, Russia*

*<sup>3</sup>Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia*

WEDNESDAY

09.30

**ID 452**

**A modified two-timescale incremental harmonic balance method for steady-state quasi-periodic responses of nonlinear systems**

Ren Ju<sup>1</sup>, Wei Fan<sup>2</sup>, Weidong Zhu<sup>3</sup>, Jianliang Huang<sup>1</sup>

<sup>1</sup>*Sun Yat-sen University, Department of Applied Mechanics, Guangzhou, China*

<sup>2</sup>*Harbin Institute of Technology, Division of Dynamics and Control, Harbin, China*

<sup>3</sup>*University of Maryland, Baltimore County, Department of Mechanical Engineering, Baltimore, USA*

09.50

**ID 124**

**The threshold behaviour of chaotization phenomenon for multiple frequency perturbations in a cell**

Mikhail Guzev<sup>1</sup>, Konstantin Koshel<sup>2</sup>

<sup>1</sup>*Institute for Applied Mathematics Far Eastern Branch Russian Academy of Sciences, Far Eastern Branch Russian Academy of Sciences, Vladivostok, Russia*

<sup>2</sup>*Pacific Oceanological Institute of FEB RAS, Far Eastern Branch Russian Academy of Sciences, Vladivostok, Russia*

10.10

**ID 395**

**Compensating symmetry breaking in planetary gearboxes by means of tooth profile modifications**

Francesco Pellicano, Asma Masoumi, Marco Barbieri

*University of Modena and Reggio Emilia, Department of Engineering Enzo Ferrari, Modena, Italy*

**Room 5 (K150)**

08.30 - 10.30

**MS 04 / I.**

**Experiments in Nonlinear Dynamics and Control**

**Chair:**

Hiroshi Yabuno

**Co-chair:**

Rafael Sanchez Crespo

08.30

**ID 17**

**Model free control of a 2-input and 2-output helicopter system**

Ying Xin<sup>1</sup>, Zhi-Chang Qin<sup>2</sup>, Wei-Guo Wu<sup>1</sup>, Jian-Qiao Sun<sup>3</sup>

<sup>1</sup>*Tianjin University, Department of Mechanics, Tianjin, China*

<sup>2</sup>*Shandong University of Technology, Department of Mechanics, Zibo, China*

<sup>3</sup>*University of California, Merced, School of Engineering, Merced, USA*

**WEDNESDAY**

08.50

**ID 31**

**Chaotic triangle wave generator implementing Chua circuit towards DC/DC converter control**

Alexandros Kordonis, Yusuke Nakakohara, Hirotaka Otake

*ROHM Co., Ltd., Discrete and Module Production (R&D), Kyoto, Japan*

09.10

**ID 159**

**Experimental testing of rotor-stator contact in a coupled double rotor system**

Rafael Sanchez Crespo<sup>1</sup>, Alexander D. Shaw<sup>1</sup>,  
Alan R. Champneys<sup>2</sup>

<sup>1</sup>*Swansea University, College of Engineering, Swansea, United Kingdom*

<sup>2</sup>*University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom*

09.30

**ID 303**

**Measurement of backbone curves of a nonlinear piezoelectric cantilever beam**

Vivien Denis<sup>1</sup>, Marguerite Jossic<sup>2</sup>, Alexandre Renault<sup>1</sup>,  
Christophe Giraud-Audine<sup>3</sup>, Olivier Thomas<sup>1</sup>

<sup>1</sup>*Arts et Metiers ParisTech, Lille, France*

<sup>2</sup>*Université Pierre et Marie Curie, Institut JLR d'Alembert UMR CNRS, Paris, France*

<sup>3</sup>*Arts et Metiers ParisTech, L2EP, Lille, France*

09.50

**ID 508**

**Parametric excitation and detection of electrostatic MEMS actuators**

Alaa Elhady<sup>1</sup>, Sangtak Park<sup>1</sup>, David Effa<sup>2</sup>, Eihab Abdel-Rahman<sup>1</sup>,  
Mustafa Yavuz<sup>2</sup>

<sup>1</sup>*University of Waterloo, Systems Design Engineering, Waterloo, Canada*

<sup>2</sup>*University of Waterloo, Mechanical and Mechatronics Engineering, Waterloo, Canada*

10.10

**ID 48**

**Data preparation for execution of experiments on rigid body motion in a resisting medium**

Maxim V. Shamolin

*Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia*

- 08.30 - 10.30**    **MS 16 / II.**  
**Random Dynamical Systems - Recent Advances and New Directions**
- Chair:** Daniil Yurchenko                      **Co-chair:** Radek Erban
- 08.30**            **ID 91**  
**Oscillation patterns in stochastic fast-slow systems**  
Christian Kuehn  
*Technical University of Munich, Department of Mathematics, Muenchen, Germany*
- 08.50**            **ID 441**  
**Multiscale methods and inverse problems in modelling of intracellular processes**  
Radek Erban  
*University of Oxford, Mathematical Institute, Oxford, United Kingdom*
- 09.10**            **ID 491**  
**A chaotic linear operator on the space of odd  $2\pi$ -periodic functions**  
Márton Kiss<sup>1</sup>, Tamás Kalmár-Nagy<sup>2</sup>  
<sup>1</sup>*Budapest University of Technology and Economics, Institute for Mathematics, Budapest, Hungary*  
<sup>2</sup>*Budapest University of Technology and Economics, Department of Fluid Mechanics, Budapest, Hungary*
- 09.30**            **ID 495**  
**Advantages of alpha-stable distribution fits for dynamic responses of nonlinear structures subjected to random excitations**  
Vikram Pakrashi<sup>1</sup>, Bidroha Basu<sup>2</sup>  
<sup>1</sup>*University College Dublin, Mechanical and Materials Engineering, Dublin, Ireland*  
<sup>2</sup>*Trinity College Dublin, Civil, Structural and Environmental Engineering, Dublin, Ireland*
- 09.50**            **ID 523**  
**Towards a bifurcation theory for random dynamical systems**  
Jeroen Lamb  
*Imperial College London, London, United Kingdom*
- 10.10**            **ID 526**  
**Hyperbolic periodic orbits in nongradient systems and small-noise-induced metastable transitions**  
Molei Tao  
*Georgia Institute of Technology, School of Mathematics, Atlanta, USA*

**08.30 - 10.30 MS 14 / I.**  
**Nonlinear Dynamics for Engineering Design**

**Chair:**  
Stefano Lenci

**Co-chair:**  
Carlos Mazzilli

**08.30 ID 30**  
**Asynchronous modes of vibration in a heavy-chain model with linear and rotational springs**  
Carlos Mazzilli<sup>1</sup>, Stefano Lenci<sup>2</sup>

<sup>1</sup>*Universidade de São Paulo, Departamento de Engenharia de Estruturas e Geotécnica, São Paulo, Brazil*

<sup>2</sup>*Università Politecnica delle Marche, Dipartimento di Ingegneria Civile, Edile e Architettura, Ancona, Italy*

**08.50 ID 121**  
**Seismic performance of base-isolated structures based on the force analogy method**

Jiting Qu, Wenqi Fang

*Dalian University of Technology, Department of Civil Engineering, Dalian, China*

**09.10 ID 137**  
**Fundamental study on dynamic property of scissoring bridge for disaster relief**

Yuki Chikahiro<sup>1</sup>, Ario Ichiro<sup>2</sup>, Adachi Kotaro<sup>2</sup>, Shimizu Shigeru<sup>1</sup>, Zenzai Seiya<sup>1</sup>, Piotr Pawlowski<sup>3</sup>, Graczykowski Cezary<sup>3</sup>, Holnicki-Szulc Jan<sup>3</sup>

<sup>1</sup>*Shinshu University, Department of Water Environment & Civil Engineering, Nagano, Japan*

<sup>2</sup>*Hiroshima University, Department of Civil & Environmental Engineering, Higashi Hiroshima, Japan*

<sup>3</sup>*Polish Academy of Sciences, Institute of Fundamental Technological Research, Warsaw, Poland*

**09.30 ID 243**  
**On the two degrees of freedom oscillator with nonlinear stiffness coupling: theoretical and experiment results**  
Gianluca Gatti<sup>1</sup>, Michael Brennan<sup>2</sup>, Ivana Kovacic<sup>3</sup>

<sup>1</sup>*University of Calabria, Department of Mechanical Energy and Management Engineering, Cosenza, Italy*

<sup>2</sup>*UNESP, Departamento de Engenharia Mecânica, Ilha Solteira (SP), Brazil*

<sup>3</sup>*University of Novi Sad, CEVAS, Novi Sad, Serbia*



09.50

**ID 315**

**The NSCD method for dynamic analyses of ancient masonry tower under transversal dynamic loadings**

Francesco Clementi, Angela Ferrante, Stefano Lenci

*Polytechnic University of Marche, Department of Civil and Building Engineering and Architecture, Ancona, Italy*

10.10

**ID 509**

**Seismic damage analysis of a Hungarian historical peasant house archetype**

Eduardo Charters Morais

*Budapest University of Technology and Economics, Structural Engineering, Budapest, Hungary*

**Room 9 (KF87)**

08.30 - 10.30

**MS 20 / I.**

**Wave Propagation in Mechanical Systems**

**Chair:**

Vassilios Rothos

**Co-chair:**

Miao Zheng

08.30

**ID 53**

**Solitary waves in dimer binary collision model: a comparative study with granular dimers**

Zaid Ahsan<sup>1</sup>, K. R Jayaprakash<sup>2</sup>

<sup>1</sup>*University of Illinois at Urbana Champaign, Department of Mechanical Science and Engineering, Champaign, USA*

<sup>2</sup>*Indian Institute of Technology Gandhinagar, Mechanical Engineering, Gandhinagar, India*

08.50

**ID 54**

**Wave propagation in granular dimers mounted on linear elastic foundation**

Zaid Ahsan<sup>1</sup>, K. R Jayaprakash<sup>2</sup>

<sup>1</sup>*University of Illinois at Urbana Champaign, Department of Mechanical Science and Engineering, Champaign, USA*

<sup>2</sup>*Indian Institute of Technology Gandhinagar, Mechanical Engineering, Gandhinagar, India*

09.10

**ID 57**

**Influence of metal internal defect on the propagation of shock wave**

Miao Zheng

*Institute of Applied Physics and Computational Mathematics, Beijing, China*

**WEDNESDAY**

09.30

**ID 68**

**Numerical investigation of pad or air gap between the high explosive and flyer in impelling**

Xin Yu

*Institute of Applied Physics and Computational Mathematics, Applied Mechanics, Beijing, China*

09.50

**ID 209**

**Wave propagation in nonlinear implicit lattices**

Vassilios M. Rothos

*Aristotle University, Thessaloniki, Greece, Department of Mechanical Engineering, Thessaloniki, Greece*

10.10

**ID 364**

**Parameter sensitivity in experimental wave propagation studies with beam like structures: shadow of chaotic scattering in continuum structural dynamics?**

Ioannis Georgiou

*National Technical University of Athens, School of Naval Architecture and Marine Engineering, Athens, Greece*

10.30 - 11.00

**Coffee break**

**Room 1 (KF51)**

11.00 - 12.00

**Keynote lecture**

**Internal resonances in tiny structures: new results and practical applications**

Steven Shaw<sup>1,2</sup>

<sup>1</sup>*Department of Mechanical and Aerospace Engineering, Florida Institute of Technology, Melbourne, FL, USA*

<sup>2</sup>*Departments of Mechanical Engineering and Physics and Astronomy, Michigan State University, East Lansing, MI, USA*

12.00 - 13.30

**Lunch break**

13.30 - 18.00

**Half day excursion**

**WEDNESDAY**

## Room 2 (K174)

**08.30 - 10.30**    **MS 21 / I.**  
**Traffic and Vehicle Dynamics**

**Chair:**  
Bart Besselink

**Co-chair:**  
Gábor Orosz

**08.30**            **ID 309**  
**Nonlinear analysis of the body sway of car-trailer combinations with nonlinear shock absorber and tire characteristics**  
Ning Zhang, Jian Ma, Tian Mi, Guo-dong Yin  
*Southeast University, School of Mechanical Engineering, Nanjing, China*

**08.50**            **ID 334**  
**The impact of non-smoothness in the tyre-force characteristics on the nonlinear dynamics of towed vehicles**  
Sandor Beregi, Denes Takacs  
*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

**09.10**            **ID 397**  
**Robust dynamic vehicle routing for on-demand systems under light load**  
Hyongju Park<sup>1</sup>, Matthew Johnson-Roberson<sup>2</sup>, Ram Vasudevan<sup>1</sup>  
<sup>1</sup>*University of Michigan Ann Arbor, Department of Mechanical Engineering, Ann Arbor, USA*  
<sup>2</sup>*University of Michigan Ann Arbor, Department of Naval Architecture and Marine Engineering, Ann Arbor, USA*

**09.30**            **ID 446**  
**Simplified model of rocking suitcases**  
Hanna Horvath<sup>1</sup>, Denes Takacs<sup>2</sup>  
<sup>1</sup>*Budapest University of Technology and Economics, Faculty of Mechanical Engineering, Budapest, Hungary*  
<sup>2</sup>*MTA-BME Research Group on Dynamics of Machines and Vehicles, Department of Applied Mechanics, Budapest, Hungary*

**09.30**            **ID 496**  
**Analysis of traffic data by considering nonlinearity and nonstationarity**  
Bidisha Ghosh, Bidroha Basu, Vikram Pakrashi  
*Trinity College Dublin, Civil, Structural and Environmental Engineering, Dublin, Ireland*

10.10

**ID 534**

**New driver assistance functions for commercial vehicles**

Peter Frank

*Knorr-Bremse Commercial Vehicle Systems, Research & Development Center,  
Budapest, Hungary*

Note that the afternoon session of MS 21 will be held  
in [Room 9 \(KF87\)](#).

**Room 3 (K155)**

**08.30 - 10.30**

**MS 12 / II.**

**Micro- and Nano-Electro-Mechanical Systems**

**Chair:**

E.M. Abdel-Raman

**Co-chair:**

Dmitrii Skubov

**08.30**

**ID 403**

**Equilibrium forms bifurcation of the nonlinear NEMS/MEMS**

Dmitrii Skubov<sup>1</sup>, Dmitrii Indeitsev<sup>1</sup>, Lev Shtukin<sup>1</sup>, Alexey Lukin<sup>2</sup>,  
Ivan Popov<sup>2</sup>

*<sup>1</sup>Institute of Problems of Mechanical Engineering Russian Academy of Sciences,  
Applied Mathematics, Saint Petersburg, Russia*

*<sup>2</sup>St. Petersburg Polytechnic University, Department of Mechanical  
and Process Engineering, Saint Petersburg, Russia*

**08.50**

**ID 77**

**Analysis of a simplified MEMS oscillator**

Richard Rand<sup>1</sup>, Alan Zehnder<sup>2</sup>, B Shayak<sup>2</sup>

*<sup>1</sup>Cornell University, Department of Mathematics and Department of Mechanical  
and Aerospace Engineering, Ithaca, USA*

*<sup>2</sup>Cornell University, Department of Mechanical and Aerospace Engineering, Ithaca, USA*

**09.10**

**ID 114**

**Dynamic release condition for latched curved micro beams**

Lior Medina<sup>1</sup>, Rivka Gilat<sup>2</sup>, Slava Krylov<sup>3</sup>

*<sup>1</sup>Tel Aviv University, Faculty of Mechanical Engineering, Tel Aviv, Israel*

*<sup>2</sup>Faculty of Engineering, Ariel University, Department of Civil Engineering, Ariel, Israel*

*<sup>3</sup>Tel Aviv University, School of Mechanical Engineering, Tel Aviv, Israel*

**09.30**

**ID 233**

**Nonlinear dynamics of microplate-based imperfect MEMS**

Mergen Ghayesh<sup>1</sup>, Hamed Farokhi<sup>2</sup>

*<sup>1</sup>University of Adelaide, School of Mechanical Engineering, Adelaide, Australia*

*<sup>2</sup>McGill University, Mechanical Engineering, Montreal, Canada*

**THURSDAY**

09.50

**ID 81**

**Pull-in instability of a typical electrostatic MEMS resonator and its suppression by a delayed position feedback**

Shang Huilin

*Shanghai Institute of Technology, School of Mechanical Engineering, Shanghai, China*

10.10

**ID 228**

**Simulations in nonlinear behavior of an electrostatically-actuated corrugated diaphragm in microelectromechanical system tunable filters**

Yu-Chiao Wu, Dimitrios Peroulis

*Purdue University, Birck Nanotechnology Center, Indiana, USA*

**Room 4 (K134)**

08.30 - 10.30

**MS 05 / I.**

**Slow-Fast Systems and Phenomena**

**Chair:**

Jon Juel Thomsen

**Co-chair:**

D. Dane Quinn

08.30

**ID 92**

**Non-hyperbolic singularities in fast-slow chemical oscillators**

Christian Kuehn

*Technical University of Munich, Department of Mathematics, Muenchen, Germany*

08.50

**ID 246**

**Effect of periodic chip formation on the stability of turning processes**

Gergely Gyebrószki<sup>1</sup>, Daniel Bachrathy<sup>1</sup>, Gábor Csernák<sup>2</sup>,  
Gabor Stepan<sup>1</sup>

<sup>1</sup>*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

<sup>2</sup>*MTA-BME Research Group on Dynamics of Machines and Vehicles, Budapest, Hungary*

09.10

**ID 322**

**Interacting global and slow manifolds**

Jose Mujica, Bernd Krauskopf, Hinke Osinga

*University of Auckland, Department of Mathematics, Auckland, New Zealand*

09.30

**ID 502**

**Dynamics of a small stiff spherical particle in an acoustic standing wave in fluid**

Vladimir Vanovskiy<sup>1</sup>, Alexander Petrov<sup>2</sup>

<sup>1</sup>*Moscow Institute of Physics and Technology (MIPT), Department of General Physics, Dolgoprudny, Russia*

<sup>2</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences, Laboratory of Mechanics of Systems, Moscow, Russia*

**THURSDAY**

09.50

**ID 471**

**Convergence of equation-free methods in the case of finite time scale separation with applications to deterministic and stochastic systems**

Jan Sieber<sup>1</sup>, Christian Marschler<sup>2</sup>, Jens Starke<sup>3</sup>

<sup>1</sup>University of Exeter, College of Engineering, Mathematics and Physical Sciences, Exeter, United Kingdom

<sup>2</sup>Technical University of Denmark, Department of Mathematics and Computer Science, Lyngby, Denmark

<sup>3</sup>University of Rostock, Institute for Mathematics, Rostock, Germany

**Room 5 (K150)**

**08.30 - 10.30**

**MS 04 / II.**

**Experiments in Nonlinear Dynamics and Control**

**Chair:**

Hiroshi Yabuno

**Co-chair:**

Fabian Schnelle

**08.30**

**ID 104**

**Experiments on adaptive nonlinear model predictive control of a pendulum**

Fabian Schnelle, Peter Eberhard

University of Stuttgart, Institute of Engineering and Computational Mechanics, Stuttgart, Germany

**08.50**

**ID 185**

**Experimental characterisation of tape spring nonlinear compliant mechanisms**

Florence Dewalque<sup>1</sup>, Cédric Schwartz<sup>2</sup>, Vincent Denoël<sup>2</sup>, Jean-Louis Croisier<sup>2</sup>, Bénédicte Forthomme<sup>2</sup>, Olivier Brûls<sup>1</sup>

<sup>1</sup>University of Liege, Department of Aerospace and Mechanical Engineering, Liege, Belgium

<sup>2</sup>University of Liege, Laboratory of Human Motion Analysis, Liege, Belgium

**09.10**

**ID 404**

**Nonlinear characteristics of hunting motion of a railway wheel set by using a roller rig**

Weiyan Wei

University of Tsukuba, School of Mechanical and Systems Engineering, Tsukuba, Japan

**09.30**

**ID 522**

**Dynamical response identification of a class of nonlinear hysteretic systems**

Biagio Carboni<sup>1</sup>, Walter Lacarbonara<sup>1</sup>, Patrick Brewick<sup>2</sup>, Sami Masri<sup>2</sup>

<sup>1</sup>Sapienza University di Roma, Department of Structural and Geotechnical Engineering, Rome, Italy

<sup>2</sup>University of Southern California, Department of Civil and Environmental Engineering, Los Angeles, USA

**THURSDAY**

09.50

**ID 142**

**Stabilization control for self-excited oscillation of cantilevered fluid-conveying pipe**

Beiming Yu

*University of Tsukuba, School of Mechanical and Systems Engineering, Tsukuba, Japan*

**Room 6 (KF81)**

**08.30 - 10.30**

**MS 17 / I.**

**Time-periodic systems**

**Chair:**

Subhash C. Sinha

**Co-chair:**

Miguel Barrios

**08.30**

**ID 88**

**A feasible analysis of quasi-periodic Mathieu equations via Floquet theory Part I.**

Ashu Sharma, Subhash Sinha

*Auburn University, Department of Mechanical Engineering, Auburn, USA*

**08.50**

**ID 88**

**A feasible analysis of quasi-periodic Mathieu equations via Floquet theory Part II.**

Ashu Sharma, Subhash Sinha

*Auburn University, Department of Mechanical Engineering, Auburn, USA*

**09.10**

**ID 112**

**Hopf bifurcation in a delayed nonlinear Mathieu equation**

Alexander Bernstein<sup>1</sup>, Si Mohamed Sah<sup>2</sup>, Robert Meller<sup>3</sup>, Richard Rand<sup>4</sup>

<sup>1</sup>*Cornell University, Center for Applied Mathematics, Ithaca, USA*

<sup>2</sup>*KTH Royal Institute of Technology, Nanostructure Physics, Stockholm, Sweden*

<sup>3</sup>*Cornell University, Department of Physics, Ithaca, USA*

<sup>4</sup>*Cornell University, Department of Mathematics and Department of Mechanical and Aerospace Engineering, Ithaca, USA*

**09.30**

**ID 126**

**On the analysis of quasi-periodic systems and a novel “deterministic” explanation of the stochastic resonance phenomenon**

Iliya Blekhman<sup>1</sup>, Vladislav Sorokin<sup>2</sup>

<sup>1</sup>*Institute of Problems of Mechanical Engineering Russian Academy of Sciences, Vibromechanics, Saint Petersburg, Russia*

<sup>2</sup>*University of Auckland, Department of Mechanical Engineering, Auckland, New Zealand*

**THURSDAY**

09.50

**ID 532**

**Minimum damping needed for vanishing an unstable pocket of a Hill equation**

Carlos Franco Tello, Joaquín Collado M.,  
Miguel Luis Ramirez Barrios

*CINVESTAV, Department of Automatic Control, Mexico City, Mexico*

10.10

**ID 307**

**Damped Hill's Equation and its application to attenuate vibrations**

Miguel Luis Ramirez Barrios, Joaquín Collado

*CINVESTAV, Department of Automatic Control, Mexico City, Mexico*

**Room 7 (KF88)**

08.30 - 10.30

**MS 14 / II.**

**Nonlinear Dynamics for Engineering Design**

**Chair:**

Marco Amabili

**Co-chair:**

Enrico Babilio

08.30

**ID 49**

**An anisometric dynamical integrity measure and its seamless variation with respect to other measures**

Pierpaolo Belardinelli<sup>1</sup>, Stefano Lenci<sup>2</sup>, Giuseppe Rega<sup>3</sup>

<sup>1</sup>*Delft University of Technology, Precision and Microsystem Engineering, Delft, The Netherlands*

<sup>2</sup>*Polytechnic University of Marche, Department of Civil and Building Engineering and Architecture, Ancona, Italy*

<sup>3</sup>*Sapienza University di Roma, Department of Structural and Geotechnical Engineering, Rome, Italy*

08.50

**ID 175**

**Hydrodynamics and stochastic dynamics of a parametric pendulum wave energy converter**

Daniil Yurchenko<sup>1</sup>, David Forehand<sup>2</sup>, Ciaran Gilbert<sup>3</sup>,  
Athanasios Giannenas<sup>1</sup>, Panagiotis Alevras<sup>4</sup>

<sup>1</sup>*Heriot-Watt University, Institute of Mechanical, Process and Energy Engineering, Edinburgh, United Kingdom*

<sup>2</sup>*University of Edinburgh, College of Engineering, Edinburgh, United Kingdom*

<sup>3</sup>*Strathclyde University, College of Engineering, Glasgow, United Kingdom*

<sup>4</sup>*Loughborough University, School of Mechanical, Electrical and Manufacturing Engineering, Loughborough, United Kingdom*

THURSDAY



09.10

**ID 182**

**A nonlinear model for design of beams operating in largely deformed configurations**

Enrico Babilio<sup>1</sup>, Stefano Lenci<sup>2</sup>

<sup>1</sup>University of Naples 'Federico II', Department of Structures for Engineering and Architecture (DiSt), Naples, Italy

<sup>2</sup>Polytechnic University of Marche, Department of Civil and Building Engineering and Architecture, Ancona, Italy

09.30

**ID 270**

**Effect of gravity on the nonlinear dynamics of an overhung rotor with annular rubs**

Elijah. T Chipato, A. D Shaw, M. I Friswell

Swansea University, College of Engineering, Swansea, United Kingdom

09.50

**ID 484**

**Parametric study of the force acting on a target during an aircraft impact**

Lili Eszter Laczák<sup>1</sup>, György Károlyi<sup>2</sup>

<sup>1</sup>Budapest University of Technology and Economics,

Department of Structural Engineering, Budapest, Hungary

<sup>2</sup>Budapest University of Technology and Economics, Institute of Nuclear Techniques, Budapest, Hungary

**Room 8 (KF82)**

08.30 - 10.30

**MS 15 / I.**

**Energy Transfer and Harvesting in Nonlinear Systems**

**Chair:**

Oleg Gendelman

**Co-chair:**

Sandra Chiacchiari

08.30

**ID 467**

**Mitigating tsunamis via nonlinear triad resonance**

Usama Kadri

Cardiff University, School of Mathematics, Cardiff, United Kingdom

08.50

**ID 39**

**Energy exchanges in a system of a forced linear structure coupled to a chain of nonlinear oscillators**

Simon Charlemagne, Alireza Ture Savadkoohi,  
Claude-Henri Lamarque

ENTPE (Ecole Nationale des Travaux Publics de l'Etat), LTDS UMR CNRS 5513,  
Vaulx-en-Velin, France

**THURSDAY**

- 09.10 ID 79**  
**Front propagation in bi-stable non-degenerate systems: model dependence and universality**  
 Itzhak Shiroky, Oleg Gendelman  
*Technion – Israel Institute of Technology, Department of Mechanical Engineering, Haifa, Israel*
- 09.30 ID 464**  
**Passive vibration control with a bistable nonlinear absorber**  
 Volodymyr Iurasov<sup>1</sup>, Pierre-Olivier Mattei<sup>2</sup>  
<sup>1</sup>Aix-Marseille University, CNRS, Centrale Marseille, LMA, Marseille, France  
<sup>2</sup>LMA (CNRS, UPR 7051), LMA, Marseille, France
- 09.50 ID 501**  
**Extreme response mitigation of stochastically forced nonlinear structures**  
 Themistoklis Sapsis  
*Massachusetts Institute of Technology, Mechanical Engineering, Cambridge, United States of America*
- 10.10 ID 340**  
**Vibration-based energy harvesting via a bistable system: experimental study**  
 Sandra Chiacchiari<sup>1</sup>, Francesco Romeo<sup>1</sup>, Michael McFarland<sup>2</sup>, Lawrence A Bergman<sup>2</sup>, Alexander F Vakakis<sup>2</sup>  
<sup>1</sup>Sapienza University of Rome, Dipartimento di Ingegneria Strutturale e Geotecnica, Rome, Italy  
<sup>2</sup>University of Illinois at Urbana-Champaign, College of Engineering, Urbana, USA

## Room 9 (KF87)

- 08.30 - 10.30 MS 20 / II.**  
**Wave Propagation in Mechanical Systems**
- Chair:** Francesco Romeo  
**Co-chair:** Ada Amendola
- 08.30 ID 199**  
**Symmetry-induced dynamic localization in lattice structures**  
 Nathan Perchikov, Oleg V. Gendelman  
*Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel*

08.50

**ID 210**

**Variety of interfacial patterns in miscible fluids induced by vibrations**

Yuri Gaponenko, Viktor Yasnou, Aliaksandr Mialdun, Valentina Shevtsova

*Université Libre de Bruxelles, Microgravity Research Center, Brussels, Belgium*

09.10

**ID 486**

**Stability of capillary waves of finite amplitude**

Mariana Lopushanski<sup>1</sup>, Alexander Petrov<sup>2</sup>

<sup>1</sup>*Moscow Institute of Physics and Technology (MIPT), Higher Mathematics Department, Moscow, Russia*

<sup>2</sup>*Institute for Problems in Mechanics, Russian Academy of Sciences, Laboratory of Mechanics of Systems, Moscow, Russia*

09.30

**ID 122**

**On the nonlinear wave dynamics of tensegrity columns**

Ada Amendola<sup>1</sup>, Gerardo Carpentieri<sup>1</sup>, Chiara Daraio<sup>2</sup>, Fernando Fraternali<sup>3</sup>

<sup>1</sup>*University of Salerno, Department of Civil Engineering, Fisciano (SA), Italy*

<sup>2</sup>*California Institute of Technology, Engineering and Applied Science, Pasadena, California, USA*

<sup>3</sup>*University of Salerno, Department of Civil Engineering, Fisciano (SA), California, USA*

09.50

**ID 356**

**A numerical study of elastic Fano resonances in degeneracy-broken trapped mode resonators for biosensing applications**

Harriet Grigg<sup>1</sup>, Barry Gallacher<sup>1</sup>, Carl Dale<sup>2</sup>, Nathan Craig<sup>1</sup>

<sup>1</sup>*Newcastle University, School of Mechanical and Systems Engineering, Newcastle upon Tyne, United Kingdom*

<sup>2</sup>*Newcastle University, Institute of Cellular Medicine, Newcastle upon Tyne, United Kingdom*

10.10

**ID 533**

**Thermalization of a coupled oscillator chain**

Giovanni Salesi, Marta Greselin

*University of Bergamo, Dipartimento di Ingegneria e Scienze Applicate, Dalmine, Italy*

10.30 - 11.00

**Coffee break**

THURSDAY

## Room 1 (KF51)

11.00 - 12.00 **Keynote lecture**

### **Tailoring nonlinearity for advanced engineering design: linearization, optimization and practical realization**

Gaëtan Kerschen

*Space Structures and Systems Laboratory, Aerospace and Mechanical Engineering Department, University of Liège, Belgium*

12.00 - 13.30 **Lunch break**

## Room 3 (K155)

13.30 - 15.30 **MS 12 / III.  
Micro- and Nano-Electro-Mechanical Systems**

**Chair:**

Slava Krilov

**Co-chair:**

Sebastien Baquet

13.30

**ID 250**

### **Effect of geometric and material nonlinearities on the dynamic behaviour of PMUTs**

Ajay Dangi<sup>1</sup>, Rudra Pratap<sup>2</sup>

<sup>1</sup>*Indian Institute of Science, Mechanical Engineering, Bangalore, India*

<sup>2</sup>*Indian Institute of Science, Centre for Nano Science and Engineering, Bangalore, India*

13.50

**ID 254**

### **Reduction of amplitude fluctuations in synchronized MEMS-based oscillators**

Martial Defoort<sup>1</sup>, Oriel Shoshani<sup>2</sup>, Steven Shaw<sup>3</sup>, David Horsley<sup>1</sup>

<sup>1</sup>*University of California Davis, Department of Mechanical and Aerospace Engineering, Davis, USA*

<sup>2</sup>*Ben-Gurion University of the Negev, Department of Mechanical Engineering, Beer-Sheva, Israel*

<sup>3</sup>*Florida Institute of Technology, Department of Mechanical and Aerospace Engineering, Melbourne, USA*

14.10

**ID 257**

**Three to one internal resonance of modes with different decay rates**

Oriel Shoshani<sup>1</sup>, Steven Shaw<sup>2</sup>, Mark Dykman<sup>3</sup>

<sup>1</sup>*Ben-Gurion University of the Negev, Department of Mechanical Engineering, Beer-Sheva, Israel*

<sup>2</sup>*Florida Institute of Technology, Department of Mechanical and Aerospace Engineering, Melbourne, USA*

<sup>3</sup>*Michigan State University, Department of Physics and Astronomy, East Lansing, USA*

14.30

**ID 271**

**Mass detection through parametric analysis and symmetry-breaking in a MEMS array**

Clément Grenat<sup>1</sup>, Van-Nghi Nguyen<sup>1</sup>, Sébastien Baguet<sup>1</sup>, Régis Dufour<sup>1</sup>, Claude Henri Lamarque<sup>2</sup>

<sup>1</sup>*INSA Lyon, LaMCoS CNRS UMR5259, Villeurbanne, France*

<sup>2</sup>*ENTPE, LTDS UMR CNRS 5513, Vaulx-en-Velin, France*

14.50

**ID 302**

**Non-linear dynamics of opto-thermally excited atomically thin graphene resonators**

Robin Dolleman<sup>1</sup>, Farbod Alijani<sup>2</sup>, Herre Van der Zant<sup>1</sup>, Peter Steeneken<sup>1</sup>

<sup>1</sup>*Delft University of Technology, Kavli Institute of Nanoscience, Delft, The Netherlands*

<sup>2</sup>*Delft University of Technology, Precision and Microsystem Engineering, Delft, The Netherlands*

15.10

**ID 311**

**Bistability of a cantilever actuated by fringing electrostatic fields**

Naftaly Krakover, Slava Krylov

*Tel Aviv University, School of Mechanical Engineering, Tel Aviv, Israel*

**Room 4 (K134)**

13.30 - 15.30

**MS 05 / II.**

**Slow-Fast Systems and Phenomena**

**Chair:**

D. Dane Quinn

**Co-chair:**

Jon Juel Thomsen

13.30

**ID 161**

**Dynamic bifurcations in slow-fast system of neuronal excitability**

Vladimir Nekorkin, Sergey Kirillov

*Institute of Applied Physics of the Russian Academy of Science, Nonlinear dynamics, Nizhni Novgorod, Russia*

**THURSDAY**

- 13.50 ID 291**  
**Multi-scale dynamics in microstructures**  
 Annalisa Iorio<sup>1</sup>, Christian Kuehn<sup>2</sup>, Peter Szmolyan<sup>1</sup>  
<sup>1</sup>Vienna University of Technology, Department of Mathematics, Vienna, Austria  
<sup>2</sup>Technical University of Munich, Faculty of Mathematics, Munich, Germany
- 14.10 ID 262**  
**The Painlevé paradox and blowup - Part I**  
 Kristian Uldall Kristiansen  
 Technical University of Denmark, Applied Mathematics, Copenhagen, Denmark
- 14.30 ID 482**  
**The Painlevé paradox and blowup - Part II**  
 John Hogan  
 University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom
- 14.50 ID 506**  
**Slow-fast Hamiltonian systems: dynamics and bifurcations**  
 Lev Lerman  
 Lobachevsky State University of Nizhni Novgorod, Department of Differential Equations, Nizhni Novgorod, Russia

## Room 5 (K150)

- 13.30 - 15.30 MS 04 / III.**  
**Experiments in Nonlinear Dynamics and Control**
- Chair:** Guilhem Michon  
**Co-chair:** Shinichi Maruyama
- 13.30 ID 162**  
**Experimental tracking of limit-point bifurcations using control-based continuation**  
 Ludovic Renson, D.A.W Barton, Simon Neild Neild  
 University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom
- 13.50 ID 264**  
**Experiments and analysis on nonlinear vibrations of a post-buckled stepped beam**  
 Shinichi Maruyama, Motofumi Hachisu, Ken-ichi Nagai, Takao Yamaguchi  
 Gunma University, Department of Mechanical Science and Technology, Kiryu, Japan
- 14.10 ID 299**  
**Numerical continuation for edge following in tactile robotics**  
 David Barton  
 University of Bristol, Department of Engineering Mathematics, Bristol, United Kingdom

THURSDAY

14.30

**ID 351**

**Nonlinear system identification of a beam with magnetic restoring forces**

Gleb Kleyman, Sebastian Schwarzendahl, Jörg Wallaschek

*Institute of Dynamics and Vibration Research, Leibniz Universität Hannover,  
Department of Mechanical Engineering, Hannover, Germany*

14.50

**ID 478**

**Vibration-based testing of bolted joints**

Jon Thomsen<sup>1</sup>, Si Mohamed Sah<sup>1</sup>, Alexander Fidlin<sup>2</sup>,  
Dmitri Tcherniak<sup>3</sup>

<sup>1</sup>*Technical University of Denmark, Department of Mechanical Engineering,  
Kgs. Lyngby, Denmark*

<sup>2</sup>*Karlsruhe Institute of Technology, Department of Engineering Mechanics,  
Karlsruhe, Germany*

<sup>3</sup>*Brüel & Kjær (Sound and Vibration Measurement), Innovation Department,  
Nærum, Denmark*

15.10

**ID 406**

**Experimental analysis of a rotor system with two-phase flow squeeze film dampers under low supply pressure**

Bingbing Han, Qian Ding, Wei Zhang, Liqing Li, Shengbo Fan

*Tianjin University, Department of Mechanics, Tianjin, China*

**Room 6 (KF81)**

13.30 - 15.30

**MS 17 / II.**

**Time-periodic systems**

**Chair:**

Thomas Pumhössel

**Co-chair:**

Tamas Kalmar-Nagy

13.30

**ID 24**

**Large time-periodic systems in engineering applications**

Peter Hagedorn, Artem Karev

*Technische Universität Darmstadt, Mechanical Engineering Department,  
Darmstadt, Germany*

13.50

**ID 86**

**On the influence of contact compliance and stiction on vibrational smoothing of dry friction**

Simon Kapelke, Wolfgang Seemann

*Karlsruhe Institute of Technology, Institute of Engineering Mechanics,  
Karlsruhe, Germany*

**THURSDAY**

14.10

**ID 260**

**Impulsive damping of mechanical systems:  
periodic solutions and energy harvesting**

Thomas Pumhössel<sup>1</sup>, Maryam Ghandchi-Tehrani<sup>2</sup>

<sup>1</sup>*Institute of Mechatronic Design and Production, Johannes Kepler University Linz,  
Austria, Faculty of Engineering and Natural Sciences, Linz, Austria*

<sup>2</sup>*Institute of Sound and Vibration Research, University of Southampton,  
Faculty of Engineering and Environment, Southampton, United Kingdom*

14.30

**ID 361**

**Stability and control of the fractional damped delayed  
mathieu equation**

Eric Butcher, Arman Dabiri

*University of Arizona, Aerospace and Mechanical Engineering, Tucson, USA*

14.50

**ID 375**

**Stability of amplitude chimeras in oscillator networks**

Eckehard Schöll

*Technische Universität Berlin, Physics, Berlin, Germany*

15.10

**ID 184**

**Modal analysis of structures in periodic states**

Barend Bentvelsen, Arnaud Lazarus

*CNRS - Université Pierre et Marie Curie, Department of Engineering Mechanics,  
Paris, France*

**Room 7 (KF88)**

13.30 - 15.30

**MS 14 / III.**

**Nonlinear Dynamics for Engineering Design**

**Chair:**

Lidiya Kurpa

**Co-chair:**

Ivana Kovacic

13.30

**ID 70**

**Nonlinear vibrations of functionally graded shallow shells  
of a complex planform in thermal environments**

Jan Awrejcewicz<sup>1</sup>, Lidiya Kurpa<sup>2</sup>, Tatiana Shmatko<sup>3</sup>

<sup>1</sup>*Lodz University of Technology, Department of Automation,  
Biomechanics and Mechatronics, Lodz, Poland*

<sup>2</sup>*National Technical University "KhPI", Department of Applied Mathematics,  
Kharkov, Ukraine*

<sup>3</sup>*National Technical University "KhPI", Department of Higher Mathematics,  
Kharkov, Ukraine*

**THURSDAY**



13.50

**ID 102**

**Nonlinear dynamics of a fluid-filled hollow microcantilever subjected to flowing particles**

Farbod Alijani, Pierpaolo Belardinelli, Murali Ghatkesar

*Delft University of Technology, Department of Mechanical,  
Materials and Manufacturing Engineering, Delft, The Netherlands*

14.10

**ID 154**

**Numerical analysis of a non-linear energy sink (NES) for the parametric excitation of a submerged cylinder**

Guilherme Rosa Franzini, Beatriz Sayuri Sato,  
Giovanna Ribeiro Campedelli

*University of São Paulo, Department of Structural and Geotechnical Engineering,  
São Paulo, Brazil*

14.30

**ID 172**

**Non-linear dynamics for contactless characterization of graphene**

Farbod Alijani<sup>1</sup>, Dejan Davidovikj<sup>2</sup>, Marco Amabili<sup>3</sup>,  
Peter G. Steeneken<sup>1</sup>

<sup>1</sup>*Delft University of Technology, Precision and Microsystem Engineering,  
Delft, The Netherlands*

<sup>2</sup>*Delft University of Technology, Nanostructure Physics, Delft, The Netherlands*

<sup>3</sup>*McGill University, Department of Mechanical Engineering, Montreal, Canada*

14.50

**ID 207**

**Sympodial fractal structures: tree-inspired concept for biomimetic engineering design**

Ivana Kovacic<sup>1</sup>, Dragi Radomirovic<sup>2</sup>, Dusan Arsic<sup>3</sup>,  
Miodrag Zukovic<sup>1</sup>

<sup>1</sup>*University of Novi Sad, CEVAS, Novi Sad, Serbia*

<sup>2</sup>*University of Novi Sad, Faculty of Agriculture, Novi Sad, Serbia*

<sup>3</sup>*University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia*

15.10

**ID 219**

**Analysis of non-linear dynamic behaviours in asphalt concrete pavements under temperature variations**

Amal Abdelaziz, Chun-Hsing Ho, Junyi Shan

*Northern Arizona University, College of Engineering, Flagstaff, USA*

**Room 8 (KF82)**

13.30 - 15.30

**MS 15 / II.**

**Energy Transfer and Harvesting in Nonlinear Systems**

**Chair:**

Oleg Gendelman

**Co-chair:**

Yuri Sudenkov

**THURSDAY**

13.30

**ID 56**

**Analytical solution for energy harvesting from nonlinear transverse vibration of an asymmetric bimorph piezoelectric plate**

Hamed Shorakaei<sup>1</sup>, Alireza Shooshtari<sup>1</sup>, Giuseppe Rega<sup>2</sup>

<sup>1</sup>Bu-Ali Sina University, Department of Mechanical Engineering, Hamedan, Iran

<sup>2</sup>Sapienza University di Roma, Department of Structural and Geotechnical Engineering, Rome, Italy

13.50

**ID 74**

**Energy exchange and localization in essentially nonlinear oscillatory systems: canonical formalism.**

Oleg Gendelman<sup>1</sup>, Themistoklis Sapsis<sup>2</sup>

<sup>1</sup>Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel

<sup>2</sup>Massachusetts Institute of Technology, Department of Mechanical Engineering, Boston, USA

14.10

**ID 127**

**Nonequilibrium response of solids to thermal and mechanical perturbances of submicro and nanosecond duration**

Yuri Sudenkov<sup>1</sup>, Vera Sventitskaya<sup>2</sup>, Boris Zimin<sup>3</sup>

<sup>1</sup>St.Petersburg State University, Department of Mechanics, St.Petersburg, Russia

<sup>2</sup>BSTU "VOENMEH", Department of Mathematics, St.Petersburg, Russia

<sup>3</sup>Institute of Problems of Mechanical Engineering, Department of Mechanics, St.Petersburg, Russia

14.30

**ID 139**

**Three-dimensional energy channeling in unit-cell model coupled to a spherical rotator**

Jayaprakash K. R.<sup>1</sup>, Yuli Starosvetsky<sup>2</sup>

<sup>1</sup>Indian Institute of Technology Gandhinagar, Mechanical Engineering, Gandhinagar, India

<sup>2</sup>Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, Haifa, Israel

14.50

**ID 295**

**Passive realization of a nonlinear piezoelectric tuned vibration absorber with a saturable inductor**

Boris Lossouarn<sup>1</sup>, Jean-François Deü<sup>2</sup>, Gaetan Kerschen<sup>1</sup>

<sup>1</sup>University of Liege, Department of Aerospace and Mechanical Engineering, Liege, Belgium

<sup>2</sup>Conservatoire national des arts et métiers, Structural Mechanics and Coupled Systems Laboratory, Paris, France

15.10

**ID 224**

**Numerical studies on piezoelectric energy harvesting from vortex-induced vibrations considering cross-wise and in-line oscillations**

Lucas Oliveira Bunzel, Guilherme Rosa Franzini

University of São Paulo, Department of Structural and Geotechnical Engineering, São Paulo, Brazil

THURSDAY

**13.30 - 15.30 MS 21 / II.**  
**Traffic and Vehicle Dynamics**

**Chair:**  
Gábor Orosz

**Co-chair:**  
Bart Besselink

- 13.30 ID 93**  
**Cooperative intersection automation using virtual platoons**  
Alejandro Ivan Morales Medina, Nathan Van de Wouw,  
Henk Nijmeijer  
*Eindhoven University of Technology, Department of Mechanical Engineering,  
Eindhoven, The Netherlands*
- 13.50 ID 230**  
**String stability for cascaded systems subject to disturbances**  
Bart Besselink<sup>1</sup>, Karl H. Johansson<sup>2</sup>  
<sup>1</sup>*University of Groningen, Johann Bernoulli Institute for Mathematics and Computer  
Science, Groningen, The Netherlands*  
<sup>2</sup>*KTH Royal Institute of Technology, Department of Automatic Control,  
Stockholm, Sweden*
- 14.10 ID 247**  
**Nonlinear traffic modeling for urban road network  
and related robust state estimation**  
Tamás Tettamanti, Márton Tamás Horváth, István Varga  
*Budapest University of Technology and Economics,  
Department of Control for Transportation and Vehicle Systems, Budapest, Hungary*
- 14.30 ID 398**  
**Artificial potential functions for control of automated vehicles**  
Elham Semsar-kazerooni<sup>1</sup>, Jeroen Ploeg<sup>1</sup>, Koos Elferink<sup>2</sup>,  
Henk Nijmeijer<sup>2</sup>  
<sup>1</sup>*TNO, Integrated vehicle safety, Helmond, The Netherlands*  
<sup>2</sup>*Eindhoven University of Technology, Mechanical Engineering,  
Eindhoven, The Netherlands*
- 14.50 ID 504**  
**Nonholonomic lane change maneuvers for connected  
and autonomous vehicles**  
Gábor Orosz, Yiming Zhang, Wubing Qin, Chaozhe He,  
Avedisov Sergei  
*University of Michigan Ann Arbor, Department of Mechanical Engineering,  
Ann Arbor, USA*

Room 1 (KF51)

16:00 - 18:00 Poster session

**ID 11**

**Pulses and snakes in the Ginzburg–Landau equation**

Stefan Mancas<sup>1</sup>, Roy Choudhury<sup>2</sup>

<sup>1</sup>Embry-Riddle Aeronautical University, Department of Mathematics, Daytona Beach, USA

<sup>2</sup>Univ. of Central Florida, Department of Mathematics, Orlando, USA

**ID 12**

**Competitive modes as reliable predictors of chaos versus hyperchaos and as geometric mappings accurately delimiting attractors**

Marianna Pensky, Roy Choudhury

Univ. of Central Florida, Department of Mathematics, Orlando, USA

**ID 21**

**Modified statistical linearization for analysing chaotic parametric space of weak-noise excited Duffing oscillator**

Ren-Jung Chang, Jun-Fu Liu, Cheng-Tang Fan

National Cheng Kung University, Mechanical Engineering Department, Tainan, Taiwan

**ID 23**

**Resonance phenomena in a two-layer shear flow interacting with two vortices in bottom layer**

Eugene Ryzhov, Konstantin Koshel

Pacific Oceanological Institute of FEB RAS, Geophysical Hydrodynamics,

Vladivostok, Russia

**ID 27**

**Binary gas mixture in a high-speed channel**

Sahadev Pradhan

Department of Chemical Engineering, Indian Institute of Science,

Department of Chemical Engineering, Bangalore, India

**ID 41**

**Non-linear dynamics of an Disc Brake System under Moving Loads**

Qian Ding, Xin Sui

Tianjin University, Department of Mechanics, Tianjin, China

**ID 43**

**Dynamic analysis of a flexible manipulator with embedded PZT actuators based on FE method**

Shao Minqiang

*Nanjing University of Aeronautics and Astronautics, College of Aerospace Engineering,  
Nanjing, China*

**ID 47**

**Using a robust torus to control chaos in low density beams**

Meirielen De Sousa, Iberê Caldas

*University of São Paulo, Institute of Physics, São Paulo, Brazil*

**ID 103**

**Application of the time-fractional diffusion equation to describing the methanol transport in the catalyst grain for methanol-to-olefin reaction**

Alexey Zhokh, Peter Strizhak

*National Academy of Sciences of Ukraine, Pisarzhevsky Institute of Physical Chemistry,  
Kiev, Ukraine*

**ID 130**

**Long-term stochastic stability of locally stable dynamical systems with respect to white noise**

Oskar Sultanov

*Institute of Mathematics, Ufa Scientific Center, Russian Academy of Sciences,  
Department of Differential Equations, Ufa, Russia*

**ID 155**

**Performance analysis of a CFRP reinforced concrete slab under a transient dynamic loading**

Lihua Huang, Yuanyuan Dong

*Dalian University of Technology, Faculty of Infrastructural Engineering, Dalian, China*

**ID 170**

**Nonlinear dynamics of a functionally graded nonlocal nanobeam in thermal environment by using incremental harmonic balance and Melnikov method**

Danilo Karličić, Milan Cajić

*Mathematical Institute of Serbian Academy of Sciences and Arts,  
Department of Mechanics, Belgrade, Serbia*

**ID 189**

**Quantifying dynamics of force networks in dense particulate matter using topological measures**

Lou Kondic<sup>1</sup>, Lenka Kovalcinova<sup>1</sup>, Miro Kramar<sup>2</sup>,  
Konstantin Mischaikow<sup>3</sup>

<sup>1</sup>New Jersey Institute of Technology, Department of Mathematical Sciences, Newark, USA

<sup>2</sup>Tohoku University, Hiraoka Laboratory, Sendai, Japan

<sup>3</sup>Rutgers University, Department of Mathematics, Piscataway, USA

**ID 214**

**Integral representation of fractional Euler-Lagrange equation with mixed boundary conditions**

Mariusz Ciesielski<sup>1</sup>, Tomasz Blaszczyk<sup>2</sup>, Jaroslaw Siedlecki<sup>2</sup>

<sup>1</sup>Institute of Computer and Information Sciences, Czestochowa University of Technology, Czestochowa, Poland

<sup>2</sup>Institute of Mathematics, Czestochowa University of Technology, Czestochowa, Poland

**ID 215**

**Imitation of synaptic coupling of electronic neurons by memristive device**

Svetlana Gerasimova<sup>1</sup>, Alexey Mikhaylov<sup>2</sup>, Alexey Belov<sup>2</sup>,  
Dmitry Korolev<sup>2</sup>, Victor Kazantsev<sup>1</sup>

<sup>1</sup>Lobachevsky State University of Nizhni Novgorod, Institute of Biology and Biomedicine, Nizhni Novgorod, Russia

<sup>2</sup>Lobachevsky State University of Nizhni Novgorod, Research Institute of Physics and Technology, Nizhni Novgorod, Russia

**ID 231**

**Nonlinear dynamical response of fluid conveyed thin-walled piezoelectric cylindrical shell**

Alireza Shooshtari, Vahid Atabakhshian

Bu-Ali Sina University, Department of Mechanical Engineering, Hamedan, Iran

**ID 251**

**Thermodynamical formalism of fractals via Fisher information: Rényi dimensions**

Bence Godó

University of Debrecen, Faculty of Science and Technology, Debrecen, Hungary

**ID 258**

**On the trajectory planning for the control of all state variables for torque-unit manipulator**

Koji Yoshida

Okayama University of Science, Department of Mechanical Systems Engineering, Okayama, Japan

**ID 263**

**Vibration power flow analysis of typical nonlinear oscillators**

Jian Yang

*University of Nottingham Ningbo China, Department of Mechanical,  
Materials and Manufacturing Engineering, Ningbo, China*

**ID 267**

**The driven Rayleigh-van der Pol oscillator**

René Bartkowiak

*University of Rostock, Applied Mechanics, Rostock, Germany*

**ID 278**

**Chattering motion of rigid objects**

Tamás Baranyai, Péter L. Várkonyi

*Budapest University of Technology and Economics, Department of Mechanics,  
Materials and Structures, Budapest, Hungary*

**ID 306**

**Inclusion–exclusion principle and description of potential  
of rigid bodies with irregular mass distribution**

Alexander Burov<sup>1,3</sup>, Anna Guerman<sup>2</sup>, Vasily Nikonov<sup>3</sup>,

<sup>1</sup>*National Research University “Higher School of Economics”,  
Department of Mathematics, Moscow, Russia*

<sup>2</sup>*University of Beira Interior, Department of Electromechanical Engineering,  
Covilha, Portugal*

<sup>3</sup>*Dorodnicyn Computing Centre, Federal Research Center “Computer Science  
and Control” of Russian Academy of Sciences, Department of Mechanics,  
Moscow, Russia*

**ID 310**

**Dance-like motions in optimal walking**

Ulrich Römer, Alexander Fidlin

*Karlsruhe Institute of Technology, Institute of Engineering Mechanics, Karlsruhe, Germany*

**ID 317**

**Asymptotic study of the model of a rowing boat**

Liubov Klimina<sup>1</sup>, Marat Dosaev<sup>1</sup>, Rinaldo Garziera<sup>2</sup>,  
Shyh-Shin Hwang<sup>3</sup>

<sup>1</sup>*Lomonosov Moscow State University, Institute of Mechanics, Moscow, Russia*

<sup>2</sup>*University of Parma, Department of Industrial Engineering, Parma, Italy*

<sup>3</sup>*Chien Hsin University of Science and Technology, Mechanical Engineering Department,  
Taoyuan City, Taiwan*

**ID 336**

**Electronic circuit emulation and numerical simulation of a fractional nonlinear macroeconomic dynamic model**

Sergio Adriani David<sup>1</sup>, Clovis Fischer<sup>1</sup>, Clivaldo Oliveira<sup>2</sup>

<sup>1</sup>Universidade de São Paulo, Department of Biosystems Engineering (ZEB), Pirassununga, Brazil

<sup>2</sup>Federal University of Grande Dourados, Departamento de Engenharia Mecânica, Dourados, Brazil

**ID 341**

**Power generation of a pendulum energy converter excited by random loads**

Leo Dostal, Marc-André Pick

Hamburg University of Technology, Institute of Mechanics and Ocean Engineering, Hamburg, Germany

**ID 347**

**Different models for balancing using accelerometer**

András Balázs Kovács, Tamás Insperger

Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary

**ID 394**

**An approximation method for solving a class of time-delay systems with constant time-delay**

Mengshi Jin, Hanwen Song, Jian Xu

Tongji University, School of Aerospace Engineering and Applied Mechanics, Shanghai, China

**ID 409**

**Entrainment and bifurcation dynamics of a dry friction oscillator**

Charles Jacob, Bipin Balam, B. Santhosh

Amrita University, Department of Mechanical Engineering, Coimbatore, India

**ID 427**

**Analysis of the forced vibration of geometrically nonlinear cantilever beam with lumping mass by multiple scale Lindstedt-Poincaré method**

Hai-En Du, Guo-Kang Er, Vai Pan lu

University of Macau, Department of Civil and Environmental Engineering, Macau SAR, China



**ID 438**

**Bifurcations of periodic solutions for systems with discontinuities**

Jacob Meijaard

*Olton Engineering Consultancy, Enschede, The Netherlands*

**ID 445**

**Optimal state feedback design with LMI techniques for the torque control of a nonlinear hydrostatic transmission**

Harald Aschemann, Robert Prabel

*University of Rostock, Faculty of Mechanical Engineering, Rostock, Germany*

**ID 455**

**Dynamics of the basketball rolling along the rim**

Vince Havas, Mate Antal, Gabor Stepan

*Budapest University of Technology and Economics, Department of Applied Mechanics, Budapest, Hungary*

**ID 474**

**Friction dependency of the controllability of rigid bodies in ideal fluids**

Sergey M. Ramodanov<sup>1</sup>, Alexey A. Kireenkov<sup>2</sup>

<sup>1</sup>*Blagonravov Institute of Machines Science of the Russian Academy of Sciences, Department of Machine Mechanics, Moscow, Russia*

<sup>2</sup>*Ishlinsky Institute for Problems in Mechanics RAS - Moscow Institute of Physics and Technology (State University), Laboratory of Mechanics of Systems, Department of Higher Mathematics, Moscow - Dolgoprudny, Russia*

**ID 475**

**On the Kukles cubic system**

Valery Gaiko

*National Academy of Sciences of Belarus, United Institute of Informatics Problems, Minsk, Belarus*

**ID 494**

**Proper orthogonal decomposition of delay-differential equations**

Balázs Heizer, Tamás Kalmár-Nagy

*Budapest University of Technology and Economics, Department of Fluid Mechanics, Budapest, Hungary*

**ID 516**

**Non-smooth modelling of a periodic structure  
with contact-friction and aero-elastic couplings**

Miroslav Byrtus<sup>1</sup>, Michal Hajzman<sup>1</sup>, Ladislav Pust<sup>2</sup>

<sup>1</sup>University of West Bohemia, Department of Mechanics, Plzen, Czech Republic

<sup>2</sup>Institute of Thermomechanics AS CR, v.v.i., -, Prague, Czech Republic

**ID 519**

**Generalized time history earthquake record  
for nonlinear dynamic analysis**

Khaldoon Bani-Hani, Mu'ath Abu Qamar

Jordan University of Science and Technology, Civil,

Structural and Environmental Engineering, Irbid, Jordan

**ID 520**

**Structural and thermal analysis of 3D printing process**

Ming-Hisao Lee<sup>1</sup>, Shou-I Chen<sup>2</sup>, Keng-Liang Ou<sup>3</sup>

<sup>1</sup>National Center for High-performance Computing, Hsinchu, Taiwan

<sup>2</sup>Instrument Technology Research Center, NARL, Hsinchu, Taiwan

<sup>3</sup>Taipei Medical University, School of Dentistry, College of Oral Medicine, Taipei, Taiwan

**ID 525**

**Low-frequency response of controlled systems on  
a high-frequency parametric excitation**

Eugen Kremer

LuK GmbH & Co.KG, Finite Elements / Dynamics Team, Buehl/Baden, Germany

**ID 527**

**A dynamical model for SIS epidemic propagation  
on adaptive networks**

Ágnes Bodó, Péter L. Simon

Eötvös Loránd University Budapest, Department of Applied Analysis and Computational

Mathematics, Budapest, Hungary

**19.00 - 24.00**

**Farewell Dinner**

**THURSDAY**

08.30 - 10.30

**MS 12 / IV.**

**Micro- and Nano-Electro-Mechanical Systems**

**Chair:**

Anil Bajaj

**Co-chair:**

Ashok Kumar Pandey

08.30

**ID 320**

**1:1 Internal resonance of two transverse modes of a microbeam using approximate mode shape**

Ashok Kumar Pandey<sup>1</sup>, Prashant N. Kambali<sup>2</sup>, Gynadutta Swain<sup>3</sup>

<sup>1</sup>Indian institute of Technology Hyderabad, Mechanical and Aerospace Engineering, Hyderabad, India

<sup>2</sup>Technion – Israel Institute of Technology, Department of Mechanical Engineering, Haifa, Israel

<sup>3</sup>Mercedes Benz, Bangalore, India

08.50

**ID 329**

**A multiple scales analysis of very large-scale arrays of globally coupled MEMS resonators**

Chaitanya Borra<sup>1</sup>, Conor S. Pyles<sup>2</sup>, D. Dane Quinn<sup>1</sup>, Jeffrey F. Rhoads<sup>2</sup>

<sup>1</sup>The University of Akron, Department of Mechanical Engineering, Akron, USA

<sup>2</sup>Purdue University, School of Mechanical Engineering, West Lafayette, USA

09.10

**ID 378**

**Demonstration of electrostatic MEMS bifurcation sensors**

Majed Alghamdi<sup>1</sup>, Mahmoud Khater<sup>2</sup>, Stewart Katherine<sup>3</sup>, Ayman Alneamy<sup>1</sup>, Ridha Almikhlafi<sup>1</sup>, Sangtak Park<sup>1</sup>, Eihab Abdel-Rahman<sup>1</sup>, Alexander Penlidis<sup>3</sup>

<sup>1</sup>University of Waterloo, Systems Design Engineering, Waterloo, Canada

<sup>2</sup>KFUPM, Mechanical Department, Dahrn, Saudi Arabia

<sup>3</sup>University of Waterloo, Chemical Engineering, Waterloo, Canada

09.30

**ID 435**

**Direct and parametric entrainment of a graphene oscillator**

Samer Hourri, Santiago Cartamil-Bueno, Menno Poot, Peter Steeneken, Herre Van Der Zant, Warner Venstra

Delft University of Technology, Kavli Institute of Nanoscience, Delft, The Netherlands

**08.30 - 10.30 MS 05 / III.**  
**Slow-Fast Systems and Phenomena**

**Chair:**  
Jon Juel Thomsen

**Co-chair:**  
D. Dane Quinn

**08.30 ID 324**  
**Twin canards and MMOs in a chemical reaction model**  
Cris Hasan, Bernd Krauskopf, Hinke Osinga  
*University of Auckland, Department of Mathematics, Auckland, New Zealand*

**08.50 ID 349**  
**Exact model reduction for a von Kármán beam**  
Shobhit Jain, George Haller, Paolo Tiso  
*ETH Zürich, Institute for Mechanical Systems, Zürich, Switzerland*

**09.10 ID 421**  
**Motion control of a flexible underactuated manipulator  
by using high-frequency excitation**  
Satoshi Kobayashi, Hiroshi Yabuno  
*University of Tsukuba, Graduate School of System and Information Engineering,  
Tsukuba, Japan*

**09.30 ID 468**  
**Faraday waves from acoustic - gravity wave theory**  
Usama Kadri  
*Cardiff University, School of Mathematics, Cardiff, United Kingdom*

**09.50 ID 528**  
**The existence of extremal solutions for a coupled system  
of nonlinear fractional integro-differential equations**  
Neda Khodabakhshi  
*Amirkabir University of Technology, Department of Mathematics and Computer Science,  
Tehran, Iran*

**08.30 - 10.30 MS 17 / III.**  
**Time-periodic systems**

**Chair:**  
Tamas Kalmar-Nagy

**Co-chair:**  
Thomas Pumhössel

**08.30 ID 145**  
**Optimal timing control using the augmented phase reduction**  
Bharat Monga, Jeff Moehlis  
*University of California, Santa Barbara, Department of Mechanical Engineering,  
Santa Barbara, California, USA*

**08.50 ID 488**  
**Stability and vibration amplitude of the quasi periodic  
delayed Mathieu equation with frequency-modulated  
coefficients**  
Daniel Bachrathy  
*Budapest University of Technology and Economics, Department of Applied Mechanics,  
Budapest, Hungary*

**09.10 ID 212**  
**Interaction of period-1 orbits in a dual-frequency driven  
asymmetric nonlinear oscillator**  
Ferenc Hegedűs<sup>1</sup>, Werner Lauterborn<sup>2</sup>, Ulrich Parlitz<sup>3</sup>,  
Robert Mettin<sup>2</sup>  
*<sup>1</sup>Budapest University of Technology and Economics,  
Department of Hydrodynamic Systems, Budapest, Hungary*  
*<sup>2</sup>Georg-August-Universität Göttingen, Third Institute of Physics, Göttingen, Germany*  
*<sup>3</sup>Max Planck Institute for Dynamics and Self-Organization, Biomedical Physics Group,  
Göttingen, Germany*

**09.30 ID 225**  
**A discrete predator-prey conflict model with defense term**  
Markus Messer<sup>1</sup>, Joachim Messer<sup>2</sup>  
*<sup>1</sup>Technische Hochschule Mittelhessen, Department of Mechanical Engineering,  
Friedberg, Germany*  
*<sup>2</sup>Justus-Liebig-Universität, Institut für Theoretische Physik, Gießen, Germany*

**09.50 ID 487**  
**Linear flows in the rapid distortion limit: dynamical systems  
analysis of the Kelvin-Townsend equations**  
Tamas Kalmar-Nagy<sup>1</sup>, Sharath Girimaji<sup>2</sup>  
*<sup>1</sup>Budapest University of Technology and Economics, Department of Fluid Mechanics,  
Budapest, Hungary*  
*<sup>2</sup>Texas A&M University, Aerospace Engineering, College Station, USA*

**08.30 - 10.30 MS 14 / IV.**  
**Nonlinear Dynamics for Engineering Design**

**Chair:**  
Marco Amabili

**Co-chair:**  
Olivier Thomas

**08.30 ID 176**  
**Vibrations of rotating composite blades with embedded nonlinear piezoelectric elements**  
Jerzy Warminski, Jaroslaw Latawski  
*Lublin University of Technology, Department of Applied Mechanics, Lublin, Poland*

**08.50 ID 44**  
**A generalised nonlinear isolator-elastic beam interaction analysis for extremely low or high supporting frequency**  
Jing Tang Xing<sup>1</sup>, Yeping Xiong<sup>1</sup>, Kamal Djidjeli<sup>2</sup>,  
Khairiah Kamilah Turahim<sup>1</sup>  
*<sup>1</sup>University of Southampton, Faculty of Engineering and Environment,  
Southampton, United Kingdom*  
*<sup>2</sup>Yaroslavl State University, Faculty of Engineering and Environment,  
Southampton, United Kingdom*

**09.10 ID 277**  
**Maximum vibration amplitude during run-up of a Jeffcott rotor at parametric anti-resonance**  
Fadi Dohnal  
*UMIT, Department of Biomedical Informatics and Mechatronics, Lienz, Austria*

**09.30 ID 346**  
**Direct antiresonance continuation for non linear dynamic absorbers**  
Olivier Thomas<sup>1</sup>, Alexandre Renault<sup>1</sup>, Hervé Mahé<sup>2</sup>  
*<sup>1</sup>Arts et Metiers ParisTech, LSIS UMR CNRS 7296, Lille, France*  
*<sup>2</sup>Valeo Transmission, Amiens, France*

**09.50 ID 425**  
**Optimization of planetary gear systems**  
Marco Barbieri, Asma Masoumi, Francesco Pellicano  
*University of Modena and Reggio Emilia, Dipartimento di Ingegneria Enzo Ferrari,  
Modena, Italy*

**08.30 - 10.30 MS 15 / III.**  
**Energy Transfer and Harvesting in Nonlinear Systems**

**Chair:**  
Brian Mann

**Co-chair:**  
Krzysztof Kecik

**08.30 ID 512**  
**Parametric resonance of a nonlinear energy harvester for torsional vibrations**

Panagiotis Alevras<sup>1</sup>, Stephanos Theodossiades<sup>1</sup>,  
Homer Rahnejat<sup>1</sup>, Tim Saunders<sup>2</sup>

<sup>1</sup>Loughborough University, Wolfson School of Mechanical and Manufacturing Engineering,  
Loughborough, United Kingdom

<sup>2</sup>Ford Engineering Research Centre, Dunton, United Kingdom

**08.50 ID 211**  
**Energy recovery from a pendulum vibration absorber with a maglev harvester**

Krzysztof Kecik<sup>1</sup>, Piotr Brzeski<sup>2</sup>, Andrzej Mitura<sup>1</sup>,  
Przemyslaw Perlikowski<sup>2</sup>

<sup>1</sup>Lublin University of Technology, Department of Applied Mechanics, Lublin, Poland

<sup>2</sup>Lodz University of Technology, Division of Dynamics, Lodz, Poland

**09.10 ID 297**  
**Nonlinear vibration energy harvesting using piezoelectric tiles placed in stairways**

Connor Edlund<sup>1</sup>, Subramanian Ramakrishnan<sup>2</sup>

<sup>1</sup>University of Minnesota, Department of Electrical Engineering, Duluth, USA

<sup>2</sup>University of Minnesota, Department of Mechanical and Industrial Engineering, Duluth, USA

**09.30 ID 461**  
**Experimental study of noise reduction using an hybrid electro-acoustic NES**

Pierre-Yvon Bryk, Sergio Bellizzi, Renaud Côte

Aix-Marseille University, CNRS, Centrale Marseille, LMA, Marseille, France

**09.50 ID 492**  
**Energy harvesting from vortex induced vibration using period-1 rotation of parametric pendulum**

Santanu Das, Pankaj Wahi

Indian Institute of Technology Kanpur, Department of Mechanical Engineering, Kanpur, India

10.10

**ID 28**

**Inverse scattering problems for the perturbed biharmonic operator**

Valery Serov

*University of Oulu, Finland, Department of Mathematics, Oulu, Finland*

10.30 - 11.00

**Coffee break**

**Room 1 (KF51)**

11.00 - 12.00

**Keynote lecture**

**Exact model reduction for nonlinear oscillations:  
from equations to data sets**

George Haller

*Chair in Nonlinear Dynamics, Institute for Mechanical Systems, ETH Zürich*

12.00 - 13.00

**Closing Ceremony**

**Announcement of ENOC 2017 Young Scientist's Prize  
and Best Poster Award**

FRIDAY



# COMMITTEE MEETINGS

## Sunday, 25 June 2017

Room K195

17.00      Meeting of the European Nonlinear Oscillations  
Conference Committee (ENOCC)

## Thursday, 29 June 2017

Room K195

17.00      Meeting of the European Nonlinear Oscillations  
Conference Committee (ENOCC)

## Tuesday, 27 June 2017

Editorial meeting of the International Journal of Dynamics and Control

Exact time and venue: TBA

# AUTHOR INDEX

Abdelaziz, Amal	87	Barton, David	84
Abdel-Rahman, Eihab	20, 37, 68, 97	Basu, Bidroha	69, 73
Abramian, Andrei	32	Baykov, Nikita	46
Abu Quamar, Mu'ath	96	Béda, Peter	33
Acary, Vincent	39	Beerens, Ruud	18
Aguirre, Pablo	16	Behn, Carsten	50, 54
Ahmed, Aftab	55	Belardinelli, Pierpaolo	78, 87
Ahsan, Zaid	71	Bellizzi, Sergio	101
Akhadkar, Narendra	39	Belov, Alexey	92
Aksenov, Andrey	22	Ben Rejeb, Jihene	29
Alevras, Panagiotis	76, 101	Bencsik, Laszlo	41
Al-Ghamdi, Majed		Bengochea, Abimael	17
Alijani, Farbod	83, 87	Bentvelsen, Barend	86
Almikhlafl, Ridha	20, 97	Beregi, Sandor	73
Alneamy, Aymán	20, 97	Berezvai, Szabolcs	57
Alqaradawi, Mohammed Yousef	47	Bergman, Lawrence A.	22, 62, 80
Alvarez, Joaquin	38	Bernay, Bruno	43
Alves, Marco	27	Bernstein, Alexander	77
Amabili, Marco	51, 63, 87	Besselink, Bart	89
Amendola, Ada	81	Biamond, Benjamin	39
Ananevskii, Igor	40	Blanchard, Antoine	22
Anderson, Johan	38	Blaszczyk, Tomasz	92
Anderson, Cole	16	Blekhman, Iliya	77
Andrianov, Igor	51	Bobrowska, Anna	37
Antali, Mate	30, 95	Bodo, Agnes	96
Aoustin, Yannick	28	Bodor, Balint	41
Armand, Jason	25	Bolotnik, Nikolay	21
Arsic, Dusan	87	Bonciolini, Giacomo	14
Aschemann, Harald	29, 95	Borra, Chaitanya	97
Atabakhshian, Vahid	92	Borreman, Jasper	38
Atanasovska, Ivana	44	Bosschaert, Maikel	45
Avon, Giuseppe	23	Boujo, Edouard	14
Avrutin, Viktor	49	Boy, Felix	47
Awrejcewicz, Jan	42, 86	Böttcher, Jonas	20
Azevedo Charters Fuentes Morais, Eduardo José de	71	Branicki, Michal	56
Babilio, Enrico	79	Brennan, Michael	70
Babitsky, Vladimir	19	Brewick, Patrick	76
Bachrathy, Daniel	18, 59, 75, 99	Brogliato, Bernard	39
Baelmans†, Tine	46	Brüls, Olivier	30, 38, 76
Baeten, Matthias	46	Bryk, Pierre-Yvon	101
Baeuerle, Simon	44	Brzeski, Piotr	101
Baguet, Sébastien	16, 83	Bučanović, Ljubiša	23
Bajaj, Anil K.	28, 66	Budai, Csaba	24
Bak, Bendegúz Dezső	43	Buezo, Javier Galvez	30
Balachandran, Balakumar	47	Buks, Eyal	66
Balaram, Bipin	38, 94	Bunzel, Lucas Oliveira	88
Bani-Hani, Khaldoon	96	Burdess, Jim	65
Baranyai, Tamás	93	Burlayenko, Vyacheslav	56
Barbieri, Marco	60, 67, 100	Burov, Alexander	66, 93
Barrio, Roberto	26	Butcher, Eric	23, 86
Barrios, Miguel Luis Ramirez	78	Byrtus, Mirosław	96
Bartkowiak, René	93	Cajić, Milan	23, 33, 91

Caldas, Iberê	91	Davidow, Matthew	63
Campedelli, Giovanna Ribeiro	87	De Sousa, Meirielen	91
Capobianco, Giuseppe	39	Defoort, Martial	82
Caponetto, Riccardo	23	Del Prado, Zenon	18
Carbajal, Javier González	63	Dellnitz, Michael	56
Carboni, Biagio	76	Demassougne, Thierry	28
Cardona, Alberto	30	Demeio, Lucio	20
Carpentieri, Gerardo	81	Denis, Vivien	68
Cartamil-Bueno, Santiago	97	Denoël, Vincent	76
Carvalho, Ana	33	Detournay, Emmanuel	29, 64
Cavalieri, Federico	30	Detroux, Thibaut	19
Cezary, Graczykowski	70	Deû, Jean-François	88
Chabchoub, Amin	34	Dewalque, Florence	76
Chakon, Ofir	31	Ding, Qian	85, 90
Champneys, Alan R.	68	Djidjeli, Kamal	100
Chang, Ren-Jung	90	Djurović, Nikola	23
Charlemagne, Simon	79	Dohnal, Fadi	100
Chavela, Ernesto Perez	17	Dolleman, Robin	65, 83
Chen, Shou-I	96	Dombovari, Zoltan	45
Chen, Li-Qun	54, 62	Domínguez, Jaime	63
Chen, Ti	18	Domokos, Gábor	17
Chen, Wen	33	Dong, Yuanyuan	91
Chernousko, Felix	20	Dosaev, Marat	93
Chiacchiari, Sandra	80	Dossogne, Tilan	43
Chikahiro, Yuki	70	Dostal, Leo	94
Chipato, Elijah T.	79	Du, Hai-En	94
Choudhury, Roy	90	Dufour, Régis	16, 83
Chwastek, Stefan	30	Duhamel, Denis	36
Ciavarella, Michele	53	Duijnhouwer, Frans	44
Ciesielski, Mariusz	92	Dutta, Ruma	62
Cirillo, Giuseppe	66	Dykman, Mark	83
Clementi, Francesco	71	Ebenbauer, Christian	34
Collado M., Joaquín	78	Eberhard, Peter	13, 35, 76
Corrêa, Rita	30	Edlund, Connor	101
Côte, Renaud	101	Effa, David	68
Craig, Nathan	81	Elferink, Koos	89
Croisier, Jean-Louis	76	Elhady, Alaa	68
Cvektović, Boško	23	Elliott, Stephen John	57
Cveticanin, Livija	34	Engelbrecht, Jüri	50
Csernák, Gábor	25, 27, 75	Enzenhöfer, Andreas	39
Daafouz, Jamal	29	Er, Guo-Kang	58, 94
Dabiri, Arman	23, 86	Erban, Radek	69
Dal Borgo, Mattia	57	Eremeykin, Sergey	18
Dale, Carl	65, 81	Eriten, Melih	62
Dangi, Ajay	82	Eugster, Simon R.	39
Danishevskyy, Vladyslav	51	Fagiani, Ramona	60
Dankowicz, Harry	16	Fan, Cheng-tang	90
Dantas, Márcio José Horta	37	Fan, Shengbo	85
Daraio, Chiara	81	Fan, Wei	67
Das, Santanu	101	Fang, Wenqi	70
David, Sergio Adriani	94	Farid, Maor	14
Davidovikj, Dejan	87	Farokhi, Hamed	74

Fatehiboroujeni, Soheil	47	Gonçalves, Paulo	18
Fehér, Eszter	57	Gong, Lulu	31
Fehr, Jörg	52	Gottlieb, Oded	32,65
Fekete, László	60	Gouskov, Alexander	64
Fenzi, Luca	25	Govaerts, Willy	27
Ferrante, Angela	71	Govind, Mohana Das	49
Fey, Rob	44, 57	Goyal, Sachin	47
Fidlin, Alexander	24, 40, 85, 93	Goyal, Rajat	66
Fiedler, Robert	26	Gögh, László	41
Figurina, Tatiana	21	Grenat, Clément	16, 83
Fischer, Clovis	94	Greselin, Marta	81
Fischer, Achim	35	Grigg, Harriet	65,81
Fontanela, Filipe	34	Grolet, Aurelien	34,53
Font-Llagunes, Josep M.	21	Grunert, Dennis	52
Forehand, David	78	Grushkovskaya, Victoria	34
Foret, Gilles	36	Gubko, Pavel	21
Formalskii, Alexander	31	Guerman, Anna	93
Forni, Fulvio	36	Guerra, Isaac Topiltzin Castanedo	48
Forthomme, Bénédict	76	Gupta, Sunit K.	64
Franzini, Guilherme Rosa	87, 88	Gupta, Sayan	32
Fraternali, Fernando	81	Guskov, Mikhail	35, 64
Freundlich, Jan	37	Gutschmidt, Stefanie	54
Friswell, M. I.	79	Guzev, Mikhail	67
Fritzkowski, Pawel	42	Gyebrószki, Gergely	27, 75
Fu, Chen	65	Habib, Giuseppe	26, 66
Gafur, Nigora	24	Hachisu, Motofumi	84
Gaiko, Valery	95	Haddad, Rami	57
Galan-Vioque, Jorge	17	Hagedorn, Peter	85
Gallacher, Barry	65, 81	Hajzman, Michal	96
Gao, Xiumin	18	Haller, George	36, 46, 62, 66, 98, 102
Gaponenko, Yuri	81	Hamann, Dominik	35
Garay, Barnabas M.	50	Han, Bingbing	85
García-Vallejo, Daniel	63	Hannam, James	27
Garziera, Rinaldo	93	Hanss, Michael	35
Gatignol, Simon	28	Harduf, Yuval	22
Gatti, Gianluca	70	Hasan, Cris	98
Gavassoni, Elvidio	17	Havas, Vince	95
Gendelman, Oleg V.	14, 22, 88	He, Chaozhe	89
Georgiou, Ioannis	28, 60, 72	Hedley, John	65
Gerasimova, Svetlana	92	Hedrih, Andjelka	51
Ghandchi-Tehrani, Maryam	19, 57, 86	Hedrih (Stevanovic), Katika	44, 51, 61
Ghatkesar, Murali	87	Heemels, Maurice	18
Ghayesh, Mergen	74	Heertjes, Marcel	58
Ghosh, Bidisha	73	Hegedűs, Ferenc	99
Giannakis, Dimitrios	47	Heizer, Balázs	95
Giannenas, Athanasios	78	Helbig, Thomas	50
Gilat, Rivka	74	Heppler, Glenn	20
Gilbert, Ciaran	78	Herrera, Christopher	62
Giraud-Audine, Christophe	68	Hetzler, Hartmut	26, 44, 47
Girimaji, Sharath	99	Ho, Chun-Hsing	44, 87
Godó, Bence	92	Hoang, Tien	36
Golmankhaneh, Alireza K.	23	Hoffmann, Norbert	34, 53

Hogan, John	84	Karličić, Danilo	33, 91
Hollenbeck, Derek	47	Károlyi, György	79
Hong, Ling	58	Katherine, Stewart	97
Horsley, David	82	Kazakova, Anastasiya	22
Horsssen, Wim T. Van	51	Kazantsev, Victor	92
Horvath, Hanna	73	Keane, Andrew	15
Horváth, Márton Tamás	89	Kecik, Krzysztof	101
HosseinNia, Hassan	33	Keegan, Neil	65
Houri, Samer	65, 97	Keren, Roee	31
Hourigan, Kerry	22	Kerschen, Gaëtan	19, 26, 43, 66, 82, 88
Hu, Haiyan	31, 40, 42, 43	Khater, Mahmoud	20, 97
Hu, Z	65	Khodabakhshi, Neda	98
Huang, Jin	47	Kianifar, Reza	20
Huang, Lihua	47, 91	Kireenkov, Alexey A.	24, 95
Huang, Jianliang	67	Kirillov, Sergey	83
Huilin, Shang	75	Kiss, Márton	69
Hwang, Shyh-Shin	93	Kiss, Adam	18
Ichiro, Ario	70	Kiyono, Ken	54
Ilic, Bojan Rob	65	Kleyman, Gleb	85
Indeitsev, Dmitry	32, 74	Klimina, Liubov	41, 52, 93
Inspurger, Tamas	47, 55, 94	Kluenker, Anna	36
Ishkhanyan, Tigran	40	Kobayashi, Satoshi	98
Iu, Vai Pan	94	Kogelbauer, Florian	66
Iuorio, Annalisa	84	Koller, Miklós	50
Iurasov, Volodymyr	80	Kondic, Lou	92
Jackson, Samuel	54	Kordonis, Alexandros	68
Jacob, Charles	94, 95	Korolev, Dmitry	92
Jain, Shobhit	98	Kosenko, Ivan	66
Jakob Flø Aarsnes, Ulf	64	Kosevich, Yuriy	41
Jan, Holnicki-Szulc	70	Koshel, Konstantin	17, 67, 90
Jayaprakash, K. R.	71, 88	Kossa, Attila	57
Jiang, Naijing	40	Kotaro, Adachi	70
Jiang, Jun	63	Kovacic, Ivana	70, 87
Jin, Mengshi	94	Kovacs, Jenó	57
Jin, Shi	55, 61	Kovács, András Balázs	94
Jin, Bensong	18	Kovács, László	24, 41
Johansson, Karl H.	89	Kovalcinova, Lenka	92
Johnson-Roberson, Matthew	73	Kovaleva, Margarita	41, 61
Jossic, Marguerite	68	Kövecses, József	21, 24, 39, 41
Ju, Ren	67	Krack, Malte	52, 53
Junca, Stéphane	40	Krakover, Naftaly	83
Jungers, Marc	19	Kramar, Miro	92
K. R., Jayaprakash	71, 88	Krause, Rolf	50
Kaczorek, Tadeusz	33	Krauskopf, Bernd	15, 27, 60, 75, 98
Kadri, Usama	79, 98	Kremer, Eugen	96
Kalmár-Nagy, Tamás	69, 95, 99	Kristiansen, Kristian Uldall	84
Kambali, Prashant N.	65, 97	Kruchinin, Pavel	31
Kandala, Shanti Swaroop	16	Krüger, Arne	40
Kanzari, Meryem	47	Krylov, Slava	65, 74, 83
Kapelke, Simon	85	Kuehn, Christian	55, 69, 75, 84
Karabut, Evqenii	52	Kumar, S. Krishna	32
Karev, Artem	85	Kuroda, Masaharu	23

Kurpa, Lidiya	86	Mann, Brian	14
Kurt, Mehmet	62	Mannini, Claudio	47
Kurushina, Victoria	22	Marck, Julien	64
Kuske, Rachel	45	Markert, Bernd	51
Kuznetsov, Yuri	27, 45	Marra, Antonino Maria	47
Lacarbonara, Walter	76	Marschler, Christian	76
Laczák, Lili Eszter	79	Maruyama, Shinichi	84
Lamarque, Claude-Henri	16, 79, 83	Masoumi, Asma	67, 100
Lamb, Jeroen	69	Masri, Sami	76
Lángi, Zsolt	17	Massai, Tommaso	47
Latalski, Jaroslaw	37, 38, 100	Matano, Hiroshi	50
Lauterborn, Werner	99	Matarazzo Orsino, Renato Maia	32
Lazarević, Mihailo	23, 33	Mattei, Pierre-Olivier	80
Lazarus, Arnaud	86	Mayet, Johannes	31
Le Bot, Alain	28	Mazzilli, Carlos	70
Le Thi, Huong	40	McFarland, D. Michael	42, 52, 62, 80
Lee, Ming-Hisao	96	Medina, Lior	74
Legrand, Mathias	39, 40, 49	Meijaard, Jacob	95
Leine, Remco I.	30, 39, 52, 53	Meijer, Hil	27
Lenci, Stefano	70, 71, 78, 79	Meller, Robert	77
Lerman, Lev	84	Messer, Markus	99
Li, Liqing	85	Messer, Joachim	99
Li, Mingwu	16	Mettin, Robert	99
Li, Beichen	20	Mi, Tian	54, 73
Li, Yunpeng	31	Mi, La	32
Li, Hongkun	31	Mialdun, Aliaksandr	81
Licskó, Gábor	25	Michiels, Wim	25, 39, 48
Lima, Roberta	59	Mikhaylov, Alexey	92
Lin, Ching-Huei	52	Mikhlin, Yuri Vladimirovich	34, 61
Linares, Cristina Pilar Martin	44	Milton, John	59
Lismonde, Arthur	38	Minqiang, Shao	91
Liu, Jun-Fu	90	Mischaikow, Konstantin	92
Liu, YuXia	46	Mitura, Andrzej	101
Liu, Liu	55	Moehlis, Jeff	99
Liu, Yang	18	Mohácsi, Bálint	41
Lokshin, Boris	41	Mohamad, Mustafa	56
Long, Xinhua	35, 56	Mohamed Sah, Si	77, 85
Lopushanski, Mariana	81	Molnar, Tamas Gabor	47
Loria, Antonio	48	Monga, Bharat	99
Lossouarn, Boris	88	Moore, Keegan	62
Lowenberg, Mark	26	Mora, Karin	65
Lu, Zeqi	54	Moradi, Sara	38
Lukin, Alexey	74	Morales Medina, Alejandro Ivan	89
Lulinsky, Stella	65	Morarescu, Irinel-Constantin	29
Luongo, Angelo	28	Morasso, Pietro	54
Ma, Jian	73	Mortier, Bert	46
Mahé, Hervé	100	Mosekilde, Erik	49
Majewski, Tadeusz	63	Mousavi Lajimi, S. Amir	37
Mall, Philipp	40	Mujica, Jose	75
Mancas, Stefan	90	Munoa, Jokin	45
Mandić, Petar	23	Nagai, Ken-ichi	84
Manevitch, Leonid	41, 42, 61	Nakakohara, Yusuke	68

Nakano, Tomonori	19	Pensky, Marianna	90
Namachchivaya, Navaratnam Sri	43, 58	Perchikov, Nathan	80
Natsiavas, Sotirios	21, 49	Perkins, Edmon	28
Nazari, Morad	23	Perlikowski, Przemyslaw	101
Neild, Simon	26, 84	Peroulis, Dimitrios	75
Neiryneck, Niels	27	Pesaresi, Luca	25
Nekorkin, Vladimir	83	Pesce, Celso Pupo	32
Nesterov, Pavel	45	Peter, Simon	52, 53
Nestola, Maria Giuseppina Chiara	50	Petrov, Alexander	22, 46, 52, 75, 81
Nguyen, Van-Nghi	83	Pfeiffer, Friedrich	31
Nijmeijer, Henk	18, 29, 38, 44, 48, 64, 89	Piccardo, Giuseppe	28
Nikonov, Vasily	93	Pick, Marc-André	94
Noel, Jean-Philippe	43	Pilbauer, Dan	25
Noiray, Nicolas	14	Pinto, Carla	33
Nomura, Taishin	54	Pinto da Costa, António	30
Obaidat, Yasmeen	57	Pisarchik, Alexander	59
Odinga, Hinke	27, 75, 98	Ploeg, Jeroen	89
Oettinger, David	46	Ponsioen, Sten	62
Oguchi, Toshiki	48	Poot, Menno	97
Ohira, Toru	45	Popov, Ivan	74
Oliveira, Clivaldo	94	Porubov, Alexey	60
Omel'chenko, Oleh E.	48	Postlethwaite, Claire	15
Omelchenko, Iryna	48	Potosakis, Nikolaos	21
Or, Yizhar	22, 30, 31	Prabel, Robert	29, 95
Orosz, Gabor	89	Pradhan, Sahadev	90
Osinga, Hinke	27, 75, 98	Pratap, Rudra	82
Otake, Hirotaka	68	Pumhoessel, Thomas	86
Otto, Andreas	35	Pust, Ladislav	96
Ou, Keng-Liang	96	Pyles, Conor S.	97
Ovcharenko, Dmitry	17	Qin, Wubing	89
Padberg-Gehle, Kathrin	36	Qin, Zhi-Chang	67
Pakrashi, Vikram	69, 73	Qu, Jiting	70
Panagiotopoulos, Ilias	16	Quinn, D. Dane	97
Pandey, Ashok Kumar	97	Radin, Michael	59, 60
Pandey, Manoj	49	Radomirovic, Dragi	87
Panovko, Grigory	18	Radons, Günter	35
Panteley, Elena	48	Rahnejat, Homer	101
Papangelo, Antonio	53	Rakaric, Zvonko	34
Paraskevopoulos, Elias	21, 49	Ramakrishnan, Subramanian	101
Park, Hyongju	73	Ramodanov, Sergey M.	95
Park, Sangtak	20, 68, 97	Rand, Richard	15, 63, 74, 77
Parlitz, Ulrich	99	Rebouças, Geraldo	37
Paschkowski, Manuela	49	Rega, Giuseppe	56, 78, 88
Pavlovskaja, Ekaterina	22	Ren, Song	35
Pawlowski, Piotr	70	Renault, Alexandre	68, 100
Peets, Tanel	50	Renson, Ludovic	84
Pei, Lijun	15	Rhoads, Jeffrey F.	97
Peiret, Albert	21	Ribeiro, Pedro	27
Pellicano, Francesco	67, 100	Rijnen, Mark	29
Pena Ramirez, Jonatan	38	Rink, Bob	38
Pender, Jamol	15	Rodnikov, Alexander V.	63
Penlidis, Alexander	97	Rodríguez-Arós, Ángel	51

Rogerson, Graham	51	Shevtsova, Valentina	81
Romeo, Francesco	42, 80	Shibata, Atsushi	19
Rothos, Vassilios M.	37, 72	Shigeru, Shimizu	70
Rottmann-Matthes, Jens	36	Shin, Gangsig	58
Römer, Ulrich	93	Shiroky, Itzhak	80
Rui, Huang	31, 42	Shishaeva, Anastasia	22
Rusinek, Rafał	35, 50	Shmatko, Tatiana	86
Ryazan, Nina	61	Shokhin, Alexander	18
Ryzhov, Eugene	17, 90	Shoostari, Alireza	88, 92
Saccon, Alessandro	29	Shorakaei, Hamed	88
Sado, Danuta	37	Shoshani, Oriel	82, 83
Saetta, Eduardo	56	Shtukin, Lev	74
Saikumar, Niranjan	33	Shugishita, Koki	45
Salesi, Giovanni	81	Sieber, Jan	76
Salles, Loic	25, 34	Siedlecki, Jaroslaw	92
Samaey, Giovanni	46	Siedler, Konrad	54
Sampaio, Rubens	59	Simkó, Marcell	50
Samsonov, Vitaly	52	Simões, Fernando	30
Sanchez Crespo, Rafael	68	Simon, Peter L.	96
Sandilo, Sajad H.	52	Singh, Harkirat	14
Santhosh, B.	94	Sinha, Subhash	77
Santos, Ilmar	37	Sipos, András Árpád	17, 57
Sapsis, Themistoklis	56, 80, 88	Skubov, Dmitrii	74
Sarkar, Sunetra	32	Smirnov, Valeri	41, 61
Sato, Beatriz Sayuri	87	Soldat, Natasa	44
Saunders, Tim	101	Song, Hanwen	94
Savadkoohi, Alireza Ture	19, 79	Sonneville, Valentin	38
Scharff, Moritz	50	Sorokin, Vladislav	77
Schmilovich, Tsvi	65	Sortino, Marco	35
Schnelle, Fabian	76	Souchet, René	20
Schorr, Philipp	21	Spoors, Julia	65
Schoukens, Maarten	43	Starke, Jens	76
Schöll, Eckehard	15, 48, 86	Starosta, Roman	42
Schwartz, Cédric	76	Starosvetsky, Yuli	61, 88
Schwarzendahl, Sebastian	85	Steeneken, Peter G.	65, 83, 87, 97
Seemann, Wolfgang	85	Steigenberger, Joachim	50
Seiya, Zenzai	70	Steindl, Alois	14
Selek, Istvan	57	Stépán, Gábor	18, 24, 25, 26, 30, 45, 47, 57, 59, 75
Selyutskiy, Yury	41	Steur, Erik	48
Semsar-Kazerooni, Elham	89	Strizhak, Peter	91
Sequeira, Dane	14	Su, Libo	48
Sergei, Avedisov	89	Sudenkov, Yuri	88
Serov, Valery	102	Sui, Xin	90
Serra, Mattia	46	Sultanov, Oskar	91
Settimi, Valeria	56	Sun, Jialiang	40
Shalimova, Ekaterina	52, 66	Sun, Jian-Qiao	67
Shamolin, Maxim V.	68	Sun, Xiuting	15
Shan, Junyi	87	Sun, Yixia	25
Sharma, Ashu	77	Suzuki, Manabu	48
Shaw, Steven	72, 82, 83	Suzuki, Yasuyuki	54
Shaw, Alexander D.	68, 79	Sventitskaya, Vera	88
Shayak, B.	63, 74	Swain, Gynadutta	97



Swigon, David	62	Wallaschek, Jörg	85
Sykora, Henrik Tamas	59	Walz, Nico-Philipp	35
Sypniewska-Kamińska, Grażyna	42	Wang, Yuefang	47
Szalai, Robert	26	Wang, Zaihua	54
Szmit, Zofia	38	Wang, Shenlong	15
Szmolyan, Peter	84	Wang, Feng	25
Takacs, Denes	55, 73	Wang, Lifeng	32
Tamm, Kert	50	Warminski, Jerzy	35, 37, 38, 100
Tang, Yixuan	53	Wei, Weiyang	76
Tao, Molei	69	Wei, Lan	46
Tatzko, Sebastian	20	Weremczuk, Andrzej	35
Tcherniak, Dmitri	85	Wesson, Elizabeth	15
Teaca, Bogdan	38	Wiercigroch, Marian	22
Teichmann, Marek	39	Winandy, Tom	39
Tello, Carlos Franco	78	Witte, Hartmut	50
Terkovics, Nandor	26	Wolfrum, Matthias	48
Tettamanti, Tamás	89	Wramner, Lina	44
Theodossiades, Stephanos	101	Wu, Yu-Chiao	75
Thomas, Olivier	68, 100	Wu, Wei-Guo	67
Thompson, Mark C.	22	Wulff, Claudia	55
Thomsen, Jon Juel	37, 85	Xibilia, Gabriella	23
Thomson, Gordon	58	Xin, Ying	67
Thorin, Anders	40, 49	Xing, Jing Tang	100
Tian, Qiang	40	Xiong, Yeping	100
Tiso, Paolo	98	Xu, Jian	15, 25, 40, 94
Totis, Giovanni	35	Xun, Chao	56
Turahim, Khairiah Kamilah	100	Yabuno, Hiroshi	19, 98
Uda, Kenneth	56	Yamaguchi, Takao	84
Unno, Motoki	19	Yan, Yao	15, 65
Vabishchevich, Petr	23	Yanagi, Daisuke	48
Vakakis, Alexander F.	22, 62, 80	Yanagisawa, Dai	19
Van de Wouw, Nathan	18, 19, 29, 64, 89	Yang, Jian	93
Van der Zant, Herre	65, 83, 97	Yang, Zhijun	42
Vanovskiy, Vladimir	75	Yasnou, Viktor	81
Varga, István	89	Yavuz, Mustafa	68
Várkonyi, Péter L.	30, 93	Yeong, Hoong	43, 58
Varszegi, Balazs	55	Yin, Guo-Dong	73
Vassena, Nicola	50	Yoong, Carlos	39
Vasudevan, Ram	73	Yoshida, Koji	92
Vedeneev, Vasily	22	Yoshitani, Naoki	23
Veiga, Gonzalo Castiñeira	51	Yu, Beiming	77
Velayudhan, Jithin	38	Yu, Xin	46, 72
Veldman, D.W.M.	57	Yu, Huijie	15
Venstra, Warner	97	Yu, Jie	17
Verriest, Erik	55	Yu, Bensong	18
Villarreal Magaña, Octavio Antonio	29	Yuan Yuan, Tianchen	62
Voges, Danja	50	Yurchenko, Daniil	58, 78
Vromen, Thijs	64	Zahedi, Abolfazl	19
Vyasarayani, C. P.	16	Zakharova, Anna	48
Vyhliđal, Tomas	25	Zehnder, Alan	74
Wahi, Pankaj	14, 64, 101	Zeidis, Igor	21
Walker, Simon	30	Zeiei, Ambrus	60

Zeng, Weikang	31
Zhang, Ning	73
Zhang, Yiming	89
Zhang, Wei	85
Zhang, Shu	40
Zhang, Li	55
Zhang, Shu	15
Zhang, Zhenghai	31
Zhao, Yonghui	31, 42
Zhao, Jisheng	22
Zhao, Ruowei	31
Zhavoronok, Sergey I.	24
Zheng, Miao	46, 71
Zhokh, Alexey	91
Zhu, Weidong	67
Zhuravleva, Elena	52
Zhusubaliyev, Zhanybai T.	49
Ziessler, Adrian	56
Zigunovs, Maksims	59
Zimin, Boris	88
Zimmermann, Klaus	21
Zukovic, Miodrag	34, 87
Zulian, Patrick	50
Zulli, Daniele	28
Zuyev, Alexander	14
Zwart, H.J.	57

# USEFUL INFORMATION

## **Climate**

The climate of Budapest is continental, at the end of June we expect very hot summer weather with a maximum daily temperature of 28-35 °C. Protect yourself from sunshine and make sure to hydrate regularly.

## **Time Zone**

Central European Summer Time (CEST): UTC+02:00

## **Insurance**

The registration fee does not include provision for the insurance of participants against personal accidents, illness, cancellation, theft, property loss or damage. Participants are advised to take adequate personal travel insurance.

## **Local currency**

The Forint (HUF) is the official national currency in Hungary. The exchange rates may vary in different banks, exchange offices and hotels, the exchange rate is around 1 Euro = 310 HUF. All the major credit cards are accepted in Hungary.

## **Electricity**

The AC electrical network in Hungary operates at 230V, 50 Hz.

## **Recommended Taxi Company**

To reach the hotels or the conference venue and to avoid any inconvenience, organisers recommend to use the City Taxi taxi company: +36 1 211 1111, [www.citytaxi.hu](http://www.citytaxi.hu). Please note, that all licensed taxi companies have yellow cars and have the same rates, placed clearly visible on the screens.

## **Parking**

If you drive a personal or rented car, always try to park at a guarded parking lot and do not leave any valuables in the car. Please note, that Budapest is divided into parking zones, with one parking meter in each street. The maximum parking time duration is 2 hours, tariffs may vary.

# CONTENTS

<b>Organizers</b>	<b>Frontside cover</b>
<b>Welcome</b>	<b>1</b>
<b>General Information</b>	<b>2-5</b>
<b>Floorplans</b>	<b>6-7</b>
<b>Programme Overview</b>	<b>8-11</b>
<b>List of Mini-Symposia</b>	<b>12</b>
<b>Detailed Programme</b>	<b>13-102</b>
<b>MS01 Reduced-Order Modeling and System Identification</b>	
MS 01 / I.	42-43
MS 01 / II.	52-53
MS 01 / III.	62
<b>MS02 Asymptotic Methods</b>	
MS 02 / I.	41-42
MS 02 / II.	51-52
MS 02 / III.	60-61
<b>MS03 Computational Methods</b>	
MS 03 / I.	16-17
MS 03 / II.	26-27
MS 03 / III.	36
MS 03 / IV.	46
MS 03 / V.	55-56
<b>MS04 Experiments in Nonlinear Dynamics and Control</b>	
MS 04 / I.	67-68
MS 04 / II.	76-77
MS 04 / III.	84-85
<b>MS05 Slow-Fast Systems and Phenomena</b>	
MS 05 / I.	75-76
MS 05 / II.	83-84
MS 05 / III.	98
<b>MS06 Fractional Derivatives</b>	
MS 06 / I.	23
MS 06 / II.	33

**MS07 Dynamics and Optimization of Multibody**

MS 07 / I.	20-21
MS 07 / II.	30-31
MS 07 / III.	40-41

**MS08 Nonlinear Phenomena in Mechanical and Structural Systems**

MS 08 / I.	17-18
MS 08 / II.	27-28
MS 08 / III.	37
MS 08 / IV.	47
MS 08 / V.	56-57
MS 08 / VI.	66-67

**MS09 Nonlinear Dynamics in Engineering Systems**

MS 09 / I.	14
MS 09 / II.	24-25
MS 09 / III.	34
MS 09 / IV.	43-44
MS 09 / V.	53-54
MS 09 / VI.	63

**MS10 Non-Smooth Dynamics**

MS 10 / I.	19-20
MS 10 / II.	29-30
MS 10 / III.	39-40
MS 10 / IV.	49-50

**MS11 Systems with Time Delay**

MS 11 / I.	15-16
MS 11 / II.	25-26
MS 11 / III.	35
MS 11 / IV.	45
MS 11 / V.	54-55
MS 11 / VI.	64-65

**MS12 Micro- and Nano-Electro-Mechanical Systems**

MS 12 / I.	65-66
MS 12 / II.	74-75
MS 12 / III.	82-83
MS 12 / IV.	97

**MS13 Nonlinear Dynamics in Biological Systems**

MS 13 / I.	50-51
MS 13 / II.	59-60

**MS14 Nonlinear Dynamics for Engineering Design**

MS 14 / I.	70-71
MS 14 / II.	78-79
MS 14 / III.	86-87
MS 14 / IV.	100

<b>MS15 Energy Transfer and Harvesting in Nonlinear Systems</b>	
MS 15 / I.	79-80
MS 15 / II.	87-88
MS 15 / III.	101-102
<b>MS16 Random Dynamical Systems - Recent Advances and New Directions</b>	
MS 16 / I.	58-59
MS 16 / II.	69
<b>MS17 Time-periodic systems</b>	
MS 17 / I.	77-78
MS 17 / II.	85-86
MS 17 / III.	99
<b>MS18 Control and Synchronization in Nonlinear Systems</b>	
MS 18 / I.	18-19
MS 18 / II.	28-29
MS 18 / III.	38
MS 18 / IV.	48-49
MS 18 / V.	57-58
<b>MS19 Fluid-Structure Interaction</b>	
MS 19 / I.	21-22
MS 19 / II.	31-32
<b>MS20 Wave Propagation in Mechanical Systems</b>	
MS 20 / I.	71-72
MS 20 / II.	80-81
<b>MS21 Traffic and Vehicle Dynamics</b>	
MS 21 / I.	73-74
MS 21 / II.	89
<b>Committee Meetings</b>	<b>103</b>
<b>Author Index</b>	<b>104-112</b>
<b>Useful Information</b>	<b>113</b>
<b>Map</b>	<b>Backside cover</b>

# MAP



The 9<sup>th</sup> European Nonlinear  
Dynamics Conference  
acknowledges the support  
provided by the following  
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