

PROGRAM

3rd International Workshop on

**Advanced Dynamics and
Model Based Control of
Structures and Machines**

September 18-22, 2017

Perm, Russia

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September 18-22, 2017, Perm, Russia



HOSTING ORGANISATION

Institute of Continuous Media Mechanics of the Ural Branch of the Russian Academy of Sciences,

Perm National Research Polytechnic University

WORKSHOP CHAIRPERSONS

Valerii P. Matveenko	Institute of Continuous Media Mechanics of the Ural Branch of the Russian Academy of Sciences, Perm, Russia
Hans Irschik	Institute for Technical Mechanics, Johannes Kepler University Linz, Austria
Michael Krommer	Institute of Mechanics and Mechatronics, Vienna University of Technology, Austria
Alexander K. Belyaev	Institute for Problems in Mechanical Engineering of Russian Academy of Sciences, St. Petersburg, Russia

LOCAL ORGANIZING COMMITTEE

Valerii P. Matveenko, Institute of Continuous Media Mechanics Ural Branch of RAS,
Anatoly A. Tashkinov, Perm National Research Polytechnic University

CONTACT

Dr. Nataliia Iurlova
Institute of Continuous Media Mechanics UB RAS
Akademika Koroleva 1, 614013 Perm, Russia
yurlova@icmm.ru

<https://www.icmm.ru/nauka/konferentsii>

AIMS, SCOPE AND OBJECTIVES

Mechanics is one of the backbones of several engineering sciences, like mechanical, automotive or aerospace engineering. It is concerned with the motion of material bodies, either solids or fluids, and with the causes of the motion: forces, couples and physical effects like thermal, electrical and magnetic fields. Control theory is a system science, where dynamic systems are investigated to control their behavior and control algorithms are designed. The combination of mechanics and control aims to design the motion of material bodies by a proper distribution of causes. To reach this goal one combines computer based control devices with sensor and actuator systems; hence, a so-called Cyber-Physical System is put into practice. The sensor and actuator systems may constitute themselves as attached components or more advanced as embodied multifunctional materials capable of converting mechanical energy into information mainly by electronic components and vice versa. Since mechatronical engineering is the integration of mechanical and electrical engineering with computer sciences and control theory, mechatronical engineering provides the physical foundation for the design of the cyber-physical system, with mechanics and control theory playing an integral and imperative role within the design process.

Mechanical engineering and automatic control allow us to describe, analyze and control the motion of material bodies, which we understand in the sense of complex material processes, of components of structures and machines as well as of machines and structures themselves. Hence, mechanics and model based control are key disciplines within mechatronical engineering; yet, the proper interaction of both requires the systematic incorporation of the effects of the attached sensor and actuator components in complex mechanical systems or of the embodied sensing and actuation authority on the dynamic behavior into the systematic study of the controllability of the motion of material bodies. Therefore, the workshop will focus on the interaction of mechanics with automatic control on three different levels; process, component and system.

The general goal of the 3rd International Workshop on Advanced Dynamics and Model Based Control of Structures and Machines is to present and discuss the frontiers in the mechanics of controlled machines and structures. The present workshop continues a series of international workshops, the Russia-Austria Joint Workshop on Advanced Dynamics and Model Based Control of Structures and Machines, the Japan-Austria Joint Workshop on Mechanics and

Model Based Control of Smart Materials and Structures and the first two editions of the International Workshops on Advanced Dynamics and Model Based Control of Structures and Machines.

The previous workshops took place in Linz, Austria in September 2008 and April 2010, in St. Petersburg, Russia in July 2012, and in Vienna, Austria in September 2015. We believe that the current edition will result into the creation of research teams with participation not only from Austria, Japan and Russia but also from other countries. Such teams should push the frontiers of mechanics and control of advanced structures and machines to new dimensions.

The key objectives of the workshop are:

- Enabling the interchange of ideas from advanced mechanics of structures and control theory.
- Clarification of expectations of research in the field of mechanics from advanced control theory and vice versa.
- Ideas for and development of bilateral research proposals.

PRESENTATION OF REPORTS

The conference will consist of oral sessions. Oral presentations will be limited to 25 min (including discussion); computer projectors will be available. Computer presentations must be prepared in English.

OFFICIAL LANGUAGE will be English.

REGISTRATION FEE The registration fee for the Workshop participants is 150 €.

ACKNOWLEDGMENT



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LINZ
CENTER OF
MECHATRONICS
GMBH

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MONDAY (18.09.2017)

Arrival and Welcome Reception

15:00 – 19:00 Registration

19:00 – 21:00 Welcome party



Tuesday

(19.09.2017)



Session 1		Chair: Valerii Matveenko, Tadaharu Adachi
8:45 – 9:00		Opening of the Workshop
9:00 - 9:25	Rudolf Heuer	R. Heuer Dynamics and stability of selected lightweight structures
9:25 - 9:50	Alexander Belyaev	A. Belyaev, V. Eliseev, H. Irschik, E. Oborin Dynamics of contour motion of belt drive by means of nonlinear rod approach
9:50 - 10:15	Dmitry Indeitsev	D. Indeitsev, D. Vavilov, A. Lukin, I. Popov, D. Skubov On static and dynamic deformation of two-phase materials
10:15 – 10:40	Kazumi Watanabe	K. Watanabe Elastodynamic Doppler Effects and Wave Energy Partition by a Sliding Interface
10:40 – 11:00	Coffee Break	
Session 2		Chair: Dmitry Indeitsev, Kazumi Watanabe
11:00 – 11:25	Michael Krommer	M. Krommer Dielectric elastomer shells: constitutive modeling and numerical implementation
11:25 – 11:50	Yeong-Bin Yang	Y.-B. Yang, J.-D. Yau Analytical investigation of dynamic coupling characteristics of slender suspension footbridges with wind-resistant ropes
11:50 – 12:15	Yuriy Raikher	Yu. Raikher Smart mechanical behavior of soft magnetorheological elastomers
12:15 – 12:40	Elena Kramarenko	E. Kramarenko, T. Nadzharyan, L. Makarova, Yu. Alekhina, G. Stepanov, E. Kazimirova, N. Perov New properties and prospective applications of highly responsive magnetoactive elastomers
12:40 – 14:00	Lunch Break	
Session 3		Chair: Alexander Belyaev, Michael Krommer
14:00 – 14:25	Ayech Benjeddou	A. Benjeddou On the use of the Levenberg-Marquardt-Fletcher algorithm for the identification of the nonlinear field-dependent power law of the shear MFC piezoelectric coupling d_{15} coefficient
14:25 – 14:50	Felix Chernousko	F. Chernousko Two-dimensional motions of a robot under the influence of

		movable internal masses
14:50 – 15:15	Oleg Naimark	O. Naimark Multiscale dynamics of damage-failure transitions and structures control under intensive loading
15:15 – 15:40	Takuya Morimoto	T. Morimoto, T. Tomita, F. Ashida Morphing of a circular sheet via differential strain
15:40 – 16:00	Coffee Break	
Session 4		Chair: Yuriy Raikher, Rudolf Heuer
16:00 – 16:25	Ryusuke Kawamura	R. Kawamura, Y. Nakanishi, K. Onoue, Y. Nagase, S. Tomomatsu, K. Yasui, K. Hayase, Z.Y. Zhou Storage performance analysis of solid sensible cylindrical heat storage block consisted of ferronickel slag
16:25 – 16:50	Martin Kozek	M. Kozek Longitudinal tunnel ventilation control: Dynamic feedforward control and non-linear disturbance observation
16:50 – 17:15	Alexander Schirrer	A. Schirrer, M. Kozek Modular adaptive solver for one-sided contact problems in rigid and elastic mechanical systems
17:15 – 17:40	Yury Vetyukov	Y. Vetyukov Finite element modeling of endless steel belts
18:30 – 19:30	Concert in the music salon at the Perm Federal Research Center Ural Branch Russian Academy of Sciences	

Wednesday (20.09.2017)



Session 5

Chair: Kurt Schlacher, Oleg Naimark

9:00 - 9:25	Tadaharu Adachi	T. Adachi, N. Matsukawa, C. Takamizo, Y. Ishii Measurement of impact load due to collision of small impactor
9:25 - 9:50	Vladimir Babeshko	O. Babeshko, O. Evdokimova, V. Babeshko The new defects which destroy the block structures
9:50 - 10:15	Toshio Furukawa	T. Furukawa Dynamic Thermal Stress Analysis of Materials with Focus
10:15 – 10:40	Vladimir Erofeev	V. Erofeev, V.Kazhaev, I.Pavlov Splitting of Strain Solitons upon Their Interaction: Experimental Observation and Mathematical Modeling

10:40 – 11:00 Coffee Break

Session 6

Chair: Ayeche Benjeddou, Oleg Plekhov

11:00 – 11:25	Masahiro Higuchi	M. Higuchi, K. Fushie, M. Kobashi, H. Tachiya Development of protective Headwear with soft epoxy foam
11:25 – 11:50	Yosuke Ishii	Y. Ishii, T. Adachi Analysis of acoustic second-harmonic generation in a multilayered structure with nonlinear interfaces
11:50 – 12:15	Vladimir Polyanskiy	A. Belyaev, V. Polyanskiy, N. Smirnova, A. Fedotov Model identification for biomorphic control of flexible systems
12:15 – 12:40	Sergey Kuznetsov	R. Goldstein, S. Kuznetsov Low frequency asymptotics of Lamb waves: application to non-destructive testing of layered structures

12:40 – 14:00 Lunch Break

14:30

Visit to the laboratory of physical strength of the Institute of Continuous Media Mechanics of the Perm Federal Research Center Ural Branch of Russian Academy of Sciences

A round table devoted to the problems of advanced dynamics and research conducted at the Institute of Mechanics and Mechatronics, Vienna University of Technology, Vienna, Austria

Chair: Oleg Naimark, Michael Krommer

18:00

Workshop dinner

Thursday (21.09.2017)



9:00 - 15:30	Visit to the Kungur Stationary Laboratory of the Mining Institute of the Perm Federal Research Center Ural Branch of Russian Academy of Sciences
	A round table devoted to the problems of Structural Health Monitoring and research conducted at the Department of Civil Engineering of the National Chi Nan University, Taiwan
	Chair: Vladimir Babeshko, Ming-Hsiang Shih

Session 7	Chair: Felix Chernousko, Toshio Furukawa
16:00 – 16:25	Sofia Kantorovich S. Kantorovich Magnetic Soft Matter in Theory and Computer Simulations
16:25 – 16:50	Ming-Hsiang Shih M.-H. Shih, W.-P. Sung An impulse-type semi-active mass damper for building structures under dynamical loading
16:50 – 17:15	Aleksandr Vakhrushev A. Vakhrushev, R. Valeev , A. Fedotov, A. Severyukhin Control of nanosensors forming on base of aluminum template
17:15 – 17:40	Valery Kalinchuk V. Kalinchuk, T. Belyankova, V. Shirokov Some problems of the mechanics of macro-, micro- and nanoscale heterostructures
17:40 – 18:00	Alexander Anoshkin A. Anoshkin, P. Pisarev Numerical calculation of stress-strain state and estimation of static strength of composite flange with defect

Friday (22.09.2017)



Session 8		Chair: Evgeny Lomakin, Yeong-Bin Yang
9:00 - 9:25	Kurt Schlacher	K. Schlacher, H. Rams Control of beam vibration by Casimir functions
9:25 - 9:50	Valerii Matveenko	V. Matveenko, N. Iurlova, N. Sevodina, D. Oshmarin, M. Iurlov Damping properties optimization of electroviscoelastic structures with external electric circuits based on natural vibration problem
9:50 - 10:15	Elena Makarevich	P. Trusov, A. Shveykin, A. Yanz, E. Makarevich Multilevel models for description of metals and alloys thermomechanical processing
10:15 – 10:40	Gennady Leonov	G. Leonov, N. Kuznetsov, M. Kiseleva Stability and oscillations in discontinuous mechanical systems
10:40 – 11:00	Coffee Break	
Session 9		Chair: Martin Kozek, Vladimir Erofeev
11:00 – 11:25	Evgeny Lomakin	E. Lomakin, B. Fedulov Nonlinear shear deformation and failure of reinforced plastics
11:25 – 11:50	Sergey Smirnov	S. Smirnov, M. Myasnikova, D. Vichuzhanin Hierarchical simulation of damage and fracture of structurally heterogeneous materials under deformation impact
11:50 – 12:15	Leonid Igumnov	L. Igumnov, A. Bragov, I. Volkov, D. Kazakov, S. Kapustin, D. Shishulin Mathematical models for evaluating strength, service life of materials and their numerical-experimental parametric identification
12:15 – 12:40	Oleg Plekhov	O. Plekhov, A. Vshivkov, A. Izumova Energy dissipation at the fatigue crack tip in metals under deformation with constant stress intensity factor
12:40 – 13:40	Lunch Break	
Session 10		Chair: Valerii Matveenko, Michael Krommer
13:40 – 14:05	Olga Bocharova	O. Bocharova, A. Sedov, I. Andgikovich, V. Kalinchuk On the method of low-frequency defectoscopy
14:05 – 14:30	Pavel Timoshenko	M. Levi, G. Levi, V. Lygov, P. Timoshenko Some features of dimensional parameters influence on the properties of the ferroelectric structure
14:30 – 18:00	Visit to the laboratory of Complex problem of solid mechanics of the Institute of Continuous Media Mechanics of the Perm Federal Research Center Ural Branch of Russian Academy of Sciences	

A round table devoted to the problems of Model Based Control of Structures and Machines and research conducted at the Department of Mechanical Engineering, Toyohashi University of Technology and Shimane University, Japan

Chair: Valerii Matveenko, Kazumi Watanabe

18:00 – 18:30

Closing of the Workshop

Saturday (23.09.2017)

9:00 – 18:00

Excursion to Belogorsky Monastery

Departure



Author Index

Author	Affiliation	Session
Adachi Tadaharu	Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Japan	S5
Anoshkin Alexander	Perm National Research Polytechnic University, Perm, Russia	S7
Babeshko Vladimir	South-Russia Research Center, Krasnodar, Russia	S5
Belyaev Alexander	Institute for Problems in Mechanical Engineering of Russian Academy of Sciences, St.Petersburg, Russia	S1
Benjeddou Ayech	Institut Supérieur de Mécanique de Paris, Paris, France	S3
Bocharova Olga	Southern scientific center of RAS, Don state technical university	S10
Chernousko Felix	Institute for Problems in Mechanics Russian Academy of Sciences, Moscow, Russia	S3
Erofeev Vladimir	Mechanical Engineering Research Institute of the Russian Academy of Sciences, Nizhny Novgorod, Russia	S5
Furukawa Toshio	University of the Ryukyus, Japan	S5
Heuer Rudolf	Center of Mechanics and Structural Dynamics at the Institute for Building Construction and Technology, Technical University of Vienna, Vienna, Austria	S1
Higuchi Masahiro	Faculty of Mechanical Engineering, Institute of Science and Technology, Kanazawa University, Japan	S6
Igumnov Leonid	Research Institute for Mechanics of National Research Lobachevsky State University of Nizhni Novgorod	S9
Indeitsev Dmitry	Institute for Problems in Mechanical Engineering Russian Academy of Sciences, St. Petersburg, Russia	S1

Ishii Yosuke	Department of Mechanical Engineering, Toyohashi University of Technology, Toyohashi, Japan	S6
Kalinchuk Valery	Southern scientific center of RAS, Don state technical university	S7
Kantorovich Sofia	Faculty of Physics, University of Vienna, Vienna, Austria	S7
Kawamura Ryusuke	Institute of Education and Research for Engineering, University of Miyazaki, Japan	S4
Kozek Martin	Institute of Mechanics and Mechatronics Vienna University of Technology, Vienna, Austria	S4
Kramarenko Elena	Faculty of Physics Lomonosov Moscow State University, Moscow, Russia	S2
Krommer Michael	Institute of Mechanics and Mechatronics Vienna University of Technology, Vienna, Austria	S2
Kuznetsov Sergey	Institute for Problems in Mechanics Russian Academy of Sciences, Moscow, Russia	S6
Leonov Gennady	Faculty of Mathematics and Mechanics St. Petersburg State University, Russia	S8
Lomakin Evgeny	Plasticity Department Lomonosov Moscow State University, Moscow, Russia	S9
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