

Faculty of Mechanical Engineering University of Niš
Centre for Nonlinear Dynamics and Active Structures
Seminar Nonlinear Dynamics – Milutin Milanković
<http://www.masfak.ni.ac.yu/endas> and <http://www.mi.sanu.ac.yu/seminars/seminar16.htm>
MATHEMATICAL INSTITUTE SANU
Project ON144002
[Http://www.mi.sanu.ac.yu](http://www.mi.sanu.ac.yu)

BESEDA O MEHANICI
(Nauka, nastava i primene)
SYMPOSIUM
ADDRESS TO MECHANICS
(Science, Teaching and Applications)
<http://www.masfak.ni.ac.yu/sitegenius/topic.php?id=863>

Editor: Katica R. (Stevanović) HEDRIH

Booklet of Abstracts

Beograd, March 28, 2009.
Mathematical Institute SANU

Approximate equations:
 a* for $\varphi = 0, \lambda > 1$
 $\ddot{\varphi} + \Omega^2(\lambda - 1)\varphi = \Omega^2\lambda c \sin \varphi \cos \varphi \cos \Omega t$
 b* for $\varphi_1 = \pm \arccos \lambda$
 $\ddot{\varphi} + \Omega^2\left(1 - \lambda^2\right)\varphi = \Omega^2\lambda c \sin \varphi \cos \varphi \cos \Omega t$

$E_p = mgh = mg\ell[\sin \alpha(1 - \cos \varphi) - \sin \alpha \cos \alpha \cos \theta]$
 $E_k = \frac{1}{2} m \ell^2 (\dot{\varphi}^2 + \dot{\theta}^2 \sin^2 \varphi)$

Faculty of Mechanical Engineering University of Niš

Centre for Nonlinear Dynamics and Active Structures

Seminar Nonlinear Dynamics – Milutin Milanković

<http://www.masfak.ni.ac.yu/cndas>

<http://http://www.mi.sanu.ac.yu/seminars/seminar16.htm>

and

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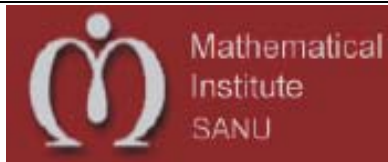
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PROGRAM

Beograd, March 28, 2009.
Mathematical Institute SANU



Academician T. Andjelić
with colleagues A. Bilimović, K. Voronjec and D. Rašković
at V. A. Vujičić's Ph. D. Thesis defend



Opening Lecture

VALERY V. KOZLOV

Real member and vice-president of
Russian Academy of Science
Steklov Mathematical Institute RAS, Moscow, Russia

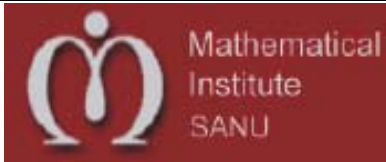


Valery V. Kozlov was born 1 January 1950 in Rjazanskaja oblast, Russia. He graduated from Moscow Lomonosov State University in 1972. He obtained a phd degree in 1974, doctoral degree - in 1978. From 1983 he is a professor of Department of Mathematics and Mechanics, MSU. In 2000 he was elected a real member of Russian Academy of Science. He is also a member of several others academies.

He is a prize-winner of the following prizes:

- prize of Leninskii Komsomol (1977),
- Lomonosov prize 1st degree (1986),
- Chaplygin prize of Academy of Science (1988),
- State prize of Russian Federation (1994),
- Kovalevskaja prize of Russian Academy of Science (2000).

Field of research: classical mechanics, chaotical dynamics, mathematical, physics, theory of stability, statistical mechanics.
He has published 150 works, 7 monographs.



PROGRAM

March 28, 2009 at 11,00h

Opening of the Symposia - Svečano otvaranje simpozijuma
 Povodom 80-og rođendana profesora Veljka A. Vujičića
 Address to 80th birthday of Professor Veljko A. Vujičić

- * Prof. dr **Zoran Marković**, director Matematičkog institute SANU
- * Dopisni član SANU **Gradimir Milovanović**, predsednik Naučnog veća Matematičkog institute SANU
- * Prof. dr **Dragoslav Šumarac**, predsednik Društva za mehaniku Srbije
- * Dopisni član SANU **Teodor Atanacković**, upravnik Odeljenja za mehaniku Matematičkog institute SANU
- * Prof. dr **Djordje Mušicki**, red. professor Fizičkog fakulteta u penziji

March 28, 2009 at 11,30h

Opening Lecture

В.В. Козлов: СПЕКТРАЛЬНЫЕ СВОЙСТВА КОНЕЧНОМЕРНЫХ ОПЕРАТОРОВ И ЗАДАЧА О ГИРОСКОПИЧЕСКОЙ СТАБИЛИЗАЦИИ

Valery V. Kozlov: Spektralna svojstva konačnodimenzionalnih operatora i zadatak giroskopske stabilizacije

March 28, 2009 at 12,10h

Veljko A. Vujičić: SFERE GRAVITACIJE VIŠEPOLARNOG DINAMIČKOG SISTEMA R
 A Z M I Š L J A N J A

Break 12,50-13,00h

March 28, 2009 at 13,00h

Ђорђе Мушички:

Развој закона одржања енергије у класичној механици, I део (од XVI века до Хамилтона).

Развој закона одржања енергије у класичној механици, II део (од Јакобија до данас)

March 28, 2009 at 13,30h

Zoran Drašković:

O određivanju operatora paralelnog pomeranja duž geodezijskih linija na površima
 On the Determination of Shifting Operators Along Geodesics on a Surface

March 28, 2009 at 14,00h

Livija Cveticanin:

March 28, 2009 at 14,30h**Mihailo P. Lazarević:**Biološki Inspirisano Upravljanje i Modeliranje (Bio)robotskih Sistema i Neke Primene Računa
Necelobrojnog Reda u MehaniciBiologically Inspired Control and Modeling of (Bio)robotic Systems and Some Applications
of Fractional Calculus in Mechanics**Break 15,00-15,30h****March 28, 2009 at 15,30h****Milutin Marjanov:**

PETLJE U SUNČEVOJ PUTANJI.

LOOPS IN THE SUN'S ORBIT

March 28, 2009 at 16,00h**Miloš Kojić, Nenad Filipović:**

Computational Mechanics in Science, Applications and Teaching

Računska mehanika u nauci, primenama i obrazovanju

March 28, 2009 at 16,30hProf. Dr.-Ing. **Tamara Nestorović**

Active Control of Mechanical Structures – from Teaching to Applications

Upravljanje aktivnih konstrukcija – od nastave do primene

March 28, 2009 at 17,00h**Dragan B. Jovanović:**Reconstruction of Isodyne Surfaces in a Square Plate and Distribution of Stress Components
in Contact RegionsRekonstrukcija površi izodina u kvadratnoj ploči i raspored komponentnih napona u oblasti
kontakta**March 28, 2009 at 17,30h****Aleksandar S. Tomić:**

The Lunar Orbit Paradox

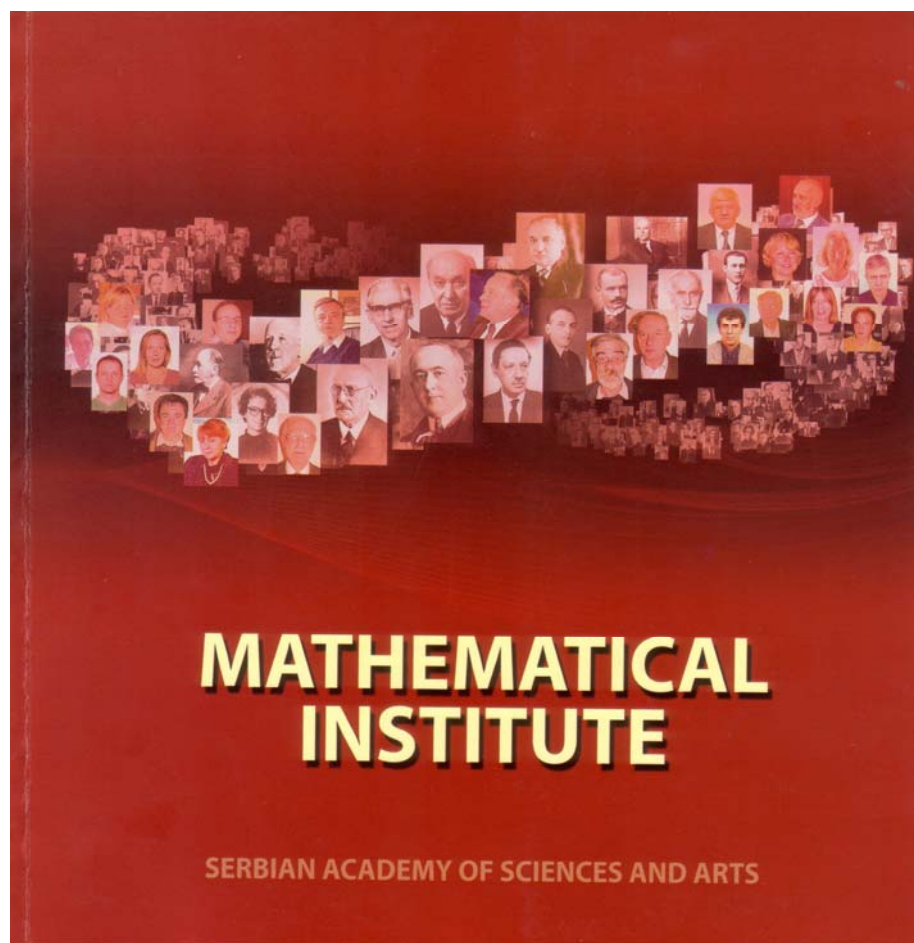
March 28, 2009 at 18,00h**Sreten B. Stojanovic, Dragutin Lj. Debeljkovic:** Asymptotic Stability Analysis of Linear
Time-Delay Systems: Delay Dependent Approach**March 28, 2009 at 18,30h****Katica R. (Stevanović) Hedrih:**

Savremeni doprinosi klasičnoj i analitičkoj mehanici

Advances in classical and analytical mechanics

Closing March 28, 2009 at 19,00h

APPENDIX I





Mathematical Institute
of the Serbian Academy of Sciences and Arts



Research Activities <ul style="list-style-type: none"> • Projects • Seminars and Colloquiums • Conferences • International Collaborations 	News <ul style="list-style-type: none"> • Weekly Schedule • Announcements
Research Centers <ul style="list-style-type: none"> • Center for Advanced Mathematical Methods in Information Technologies (CAMMIT) • Center for Dynamical Systems - Geometry - Combinatorics (DSGC-synergy) • National Center for Digitization 	Regional Information Center <ul style="list-style-type: none"> • EMIS • Zentralblatt MATH • MATHDL • Links to other institutions • The job market for Mathematicians • Affiliated Societies
Publications <ul style="list-style-type: none"> • Publications de l'Institut Mathématique • Visual Mathematics • Non-Periodical Publications 	Members <ul style="list-style-type: none"> • Full-Time • Part-Time • Administrative Staff
The Library of the Institute <ul style="list-style-type: none"> • Library Catalog • Electronic Resources • Other Mathematics Libraries 	About the Institute <ul style="list-style-type: none"> • Mission and History • Contact Information • About this site • 60th ANNIVERSARY CELEBRATION

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Mathematical Institute SANU

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Colloquiums

Since 1961 the Institute has presented two colloquiums of general interest: the Mathematics Colloquium and the Mechanics Colloquium. These weekly meetings are organized under the supervision of the Scientific Council of the Institute.

Mathematics Colloquium	Mechanics Colloquium
--	--------------------------------------

Seminars

Seminars have always been of vital importance to the Institute. In these seminars members of the Institute meet regularly to exchange views and information through lectures and discussions. The following list provides an abbreviated report on the current state of our seminar activities.

Mathematical Logic	Applied Mathematics
Geometry, Algebra and Topology	Mathematical Methods of Mechanics
History and Philosophy of Mathematics and Mechanics	Geometry, Education and Visualization with Applications
Cryptology	Stochastics
Hydrodynamics Stability and Turbulence	Automated Reasoning and Parallelism
Foundations of Mathematics (in Kragujevac)	Generalized Product and Integral Transformations (in Novi Sad)
Orthogonality and Applications (in Niš)	Algebra (in Niš)
Nonlinear Dynamics (in Niš)	Generalized Inverse and Applications (in Niš)

The Founders of the Institute



Dr. Bilimović Anton



Dr. Kašanin Radivoj



Dr. Gavrilović Bogdan



Dr. Milanković Milutin



Dr. Mišković Vojislav



Dr. Saltikov Nikola



Dr. Karamata Jovan

Mechanics Colloquium

History of the Mechanics Colloquium



Academician Tatomir P. Andjelic

(1903 - 1993)

First Head of the Mechanics Department
at the Institute of Mathematics of the Serbian Academy of Sciences
(1961, 1963-1984)



Prof. dr Ing. Dipl. Math. Danilo P. Rašković

(1910-1985)

Head of the Mechanics Department in 1962.
at the Institute of Mathematics of the Serbian Academy of Sciences

Na drugoj sednici od 8. juna 1946 godine Savet

Matematičkog instituta SAN izabrao je prvih 7 stalnih saradnika. Iz Zapisnika sa te druge sednice se vidi da je sednicom predsedavao Upravnik akademik Anton Bilimović, a da je dr Tatomir Andjelić *izabran za stalnog saradnika* Matematičkog instituta.

Medju prvih sedam stalnih članova saradnika su bili dr Ivan Arnovljević, Jakov Hlitičijev, dr Tadija Pejović, dr Milan Radoičić, dr Tatomir P. Andjelić i dr Vojislav Avakumović. Kroz godinu dana, 4 marta 1947 godine članovi su postali i docenti tehničkog fakulteta dr Danilo Rašković i dr Miodrag Milosavljević, koji su prethodno saopćili svoje radove.

1984-2000

Head:



Dr. Veljko Vujčić

Principal task of Colloquium is to organize:

- regular weekly lectures (colloquium talks) which range from expository lectures in pure and applied mechanics to original research reports;
- public presentation and evaluation of scientific projects supported by the federal and republic Ministry of Science and Technology;
- visits of foreign mathematicians;
- workshops, mini conferences, presentations of books, software, video lectures etc;
- oversight of the seminars.

The current head of Mechanics Colloquium is Prof. Vladan Đorđević.

2000-2006

Chairman:



Dr. Vladan Đorđević

Principal task of the Mechanics Colloquium is to organize:

- weekly lectures (colloquium talks) which range from expository lectures in pure and applied mechanics to original research reports;
- public presentation and evaluation of scientific projects supported by the federal and republic Ministry of Science and Technology;
- visits of foreign mathematicians;
- workshops, mini conferences, presentations of books, software, video lectures etc;
- oversight of the seminars.

The current chairman of the Mechanics Colloquium is Dr. Vladan Đorđević with Božidar Jovanović as secretary.

From **2007-**
Chairman:



Dr. Teodor
Atanacković

Principal task of the Mechanics Colloquium is to organize:

- weekly lectures (colloquium talks) which range from expository lectures in pure and applied mechanics to original research reports;
- public presentation and evaluation of scientific projects supported by the federal and republic Ministry of Science and Technology;
- visits of foreign mathematicians;
- workshops, mini conferences, presentations of books, software, video lectures etc;
- oversight of the seminars.

The current chairman of the Mechanics Colloquium is Dr. Teodor Atanacković with Bojan Medjo as secretary.

Past Projects (1996–2000)

PROJECT 04M03

Methods and Models in Theoretical, Applied and Industrial Mathematics

- Actual Problems of Mechanics and Applications
- Algebra
- Approximation, Numerical Methods and Optimization
- Differential Geometry and Applications
- Mathematical Analysis
- Combinatorial Topology and Applications in Discrete and Computational Geometry
- Stochastic Analysis



Project leader: Dr. Katica (Stevanovic)
Hedvli

PROJECT 04M03A Actual Problems of Mechanics and Applications

The objectives are defined in accordance with basic intentions of the Mechanics Colloquium, that is to apply modern mathematical methods and concepts to problems in mechanics and, on the other hand, to help create mathematics applicable to such problems. They can be described as follows.

- 1. Reexamination of basic principles of mechanics.
- 2. Formulation of general theorems on the control of motion and applications to mechanic systems. Extending theorems on the stability and equilibrium to systems with time-dependent constraints; nonlinear dynamic systems; practical stability.
- 3. Modern mathematical methods in mechanics: nonautonomous and nonholonomic systems. Integrability and nonintegrability of a system with unilateral constraints.
- 4. The motion of rigid bodies and their inertial structure.
- 5. Theory and applications of: isothermic and nonisothermic fluid flow, mixtures, turbulence.

Past Projects (2002–2005)
supported by the Ministry of Science, Technology and Development,
Republic of Serbia

PROJECT 1616 **Real Problems On Mechanics**
(Realni problemi mehanike)
Project leader: [Dr. Katica Hedrih](#) katica@masfak.ni.ac.yu
Project Description ([English](#) | [Serbian](#)) [List of Researchers](#)

PROJECT 1643 **Geometry and Topology of Manifolds and Integrable Dynamical Systems**
(Geometrija i topologija mnogostrukosti i integrabilni dinamički sistemi)
Project leader: [Dr. Vladimir Dragović](#) vladad@mi.sanu.ac.yu
Project Description ([English](#) | [Serbian](#)) [List of Researchers](#)

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Current Projects (2006–present)
supported by the Ministry of Science, Technology and Development,
Republic of Serbia

[Fundamental Research](#) | [Technological Development](#) | [Interdisciplinary](#) | [Past Projects](#)

Fundamental Research

PROJECT 144002 **Theoretical and Applied Mechanics of the Rigid and Solid Bodies. Mechanics of Materials**
(Problemi teorijske i tehničke mehanike krutih i čvrstih tela. Mehanika materijala)
Project leader: [Dr. Katica Hedrih](#) katica@masfak.ni.ac.yu
Project Description ([English](#) | [Serbian](#)) [List of Researchers](#) [Recent results](#)

Fundamental Research (2006–2010)

Theoretical and Applied Mechanics of the Rigid and Solid Bodies. Mechanics of Materials (Project 144002)

Today, it seems generally accepted that nonlinear dynamical problems should be cooperatively addressed through the combined use of analytical, computational, geometrical and experimental approach. Moreover, the interaction between nonlinear dynamics and control plays an important role in advanced engineering systems in order to obtain desired dynamics behavior and improved reliability during operation. The nonlinear deterministic and stochastic dynamics and control of processes in complex mechanical systems are subject of our project research.

New mathematical and phenomenological knowledge will be an advance to theoretical and applied mechanics of the rigid and solid bodies and complex hybrid structures and dynamical systems with applications in mechanical engineering. Mechanics of materials with coupled fields is also subject of project research. The possibilities for the development of control laws, which will enable desired behavior of the active materials and structures will be considered as well. Advances in the form of mathematical description of deterministic



Project Leader:
Katica (Stevanović) Hedrih

and stochastic dynamics of complex hybrid systems with coupled rigid and solid bodies by standard light elements and dynamic constraints are planed as research results.

Proposed research is actual in the world scientific community, and is important for both advances to the mathematical theory of mechanics and for applications in engineering. Research will be directed to the field of theoretical and applied mechanics and realized by more then 40 researchers.

Seminar for *Nonlinear Dynamics – Milutin Milanković* was spontaneously organized by the Project researchers

as a forum for scientific research results evaluations and is working at Faculty of Mechanical Engineering in Niš supported by researchers from other Serbian Universities and by visiting professors from all the World.

Home page of the Project:
<http://www.mi.sanu.ac.yu/projects/projects.htm>
Home page of the Projct Seminar:
<http://www.masfak.ni.ac.yu/sitegenius/topic.php?id=863>