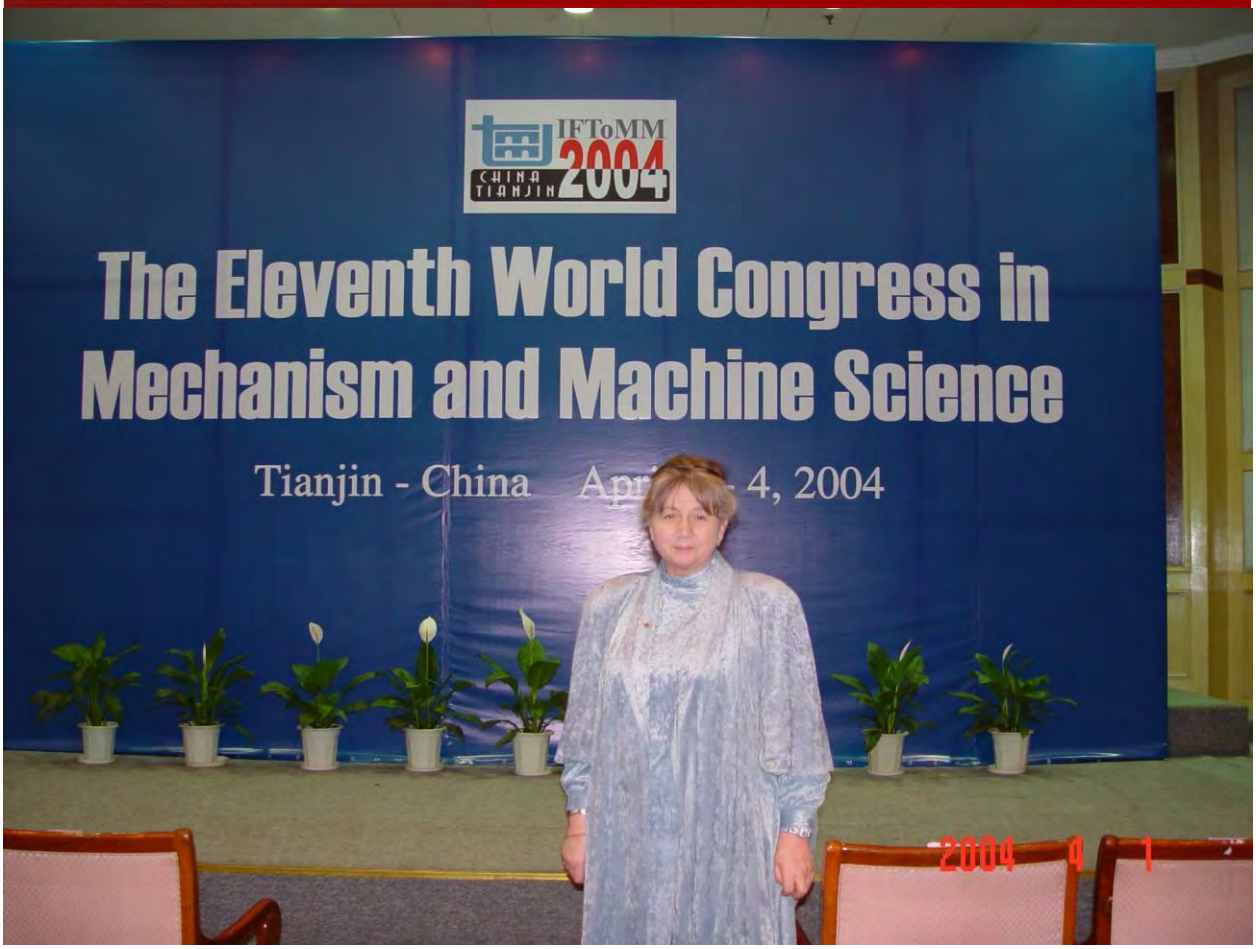
Mathematical Institute SANU

Nonlinear Dynamics –
Scientific work of Prof. Dr Katica (Stevanovic) Hedrih
Belgrade, 04.-06. September, 2019



Seminar

Mechanics of Machines and Mechanisms – Models and Mathematical Methods

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The chairman
Prof. dr Katica R. (Stevanović) Hedrih

The co-chairman
dr Ivana Atanasovska,
Asocoated Researcj Prpfesspr

Seminar

Mechanics of Machines and Mechanisms – Models and Mathematical Methods

http://www.mi.sanu.ac.rs/novi_sajt/research/seminars/mechanics_machines_mechanisms.php

Seminar Mechanics of Machines and Mechanisms - Models and Mathematical Methods focuses primarily on the presentation of new research results in the field of applied mathematics and mechanics on solving a wide range of kinematic and dynamic models of machine mechanics, as well as the development of abstraction models of real machine dynamics, down to the mathematical descriptions and mathematical identification of oscillatory phenomena and their graphic representations. The seminar includes scientific lectures and presentations on scientific accomplishments in areas such as: the dynamics and stability of models of real machines and other real complex mechanical systems and structures, as well as nonlinear oscillations and nonlinear phenomena in their dynamics. The elastodynamics of the models of machines and complex structures, their load capacity and dimensioning based on new scientific knowledge of mathematics and continuum mechanics are also the subject of the seminar. Lectures dealing with multi-criteria optimization of the shape of complex system structures and new descriptions of constitutive relations of materials, as well as fracture mechanics and damage mechanics, have also been welcomed. The seminar will also include a presentation and discussions in the fields of developing of mathematical methods and models, as well as the application of numerical methods and computer techniques in all other scientific areas related to the mechanics of machines and mechanisms, such as: coupled problems in science and engineering, biomimetics and mechanics of new materials.

The seminar was inspired by the scientific activities and results of the ON174001 Project "Dynamics of hybrid systems with complex structures. Mechanics of materials" (2011 - 2019).

The chairman is Prof. dr Katica (Stevanović) Hedrih and the co-chairman is dr Ivana Atanasovska. The secretary of the Seminar is dr Milan Cajić.

Starting from June 2018, Seminar sessions will be held twice a month, on Tuesdays from 17:00 to 19:00, at the Mathematical Institute of SASA.

1. **Lecturer**: Katica (Stevanović) Hedrih
Afilation: Mathematical Institute SANU
Data: 12.06.2018.
Lunk:
http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.jun2018.php

Lecture: Phase trajectory method and trigger of coupled singular points in investigation of different model nonlinear dynamics of multi-step reductor/multiplier systems

Lecture is dedicated to 150 years from birthday of Serbian Scientist Mihailo Petrović, Founding Father of Serbian Mathematics

Keywords: Phase trajectory method, trigger of coupled singular points, bifurcation, phase portrait, mechanical energy surfaces, homoclinic orbits and points, separatrice layering, couple triggers, trajectory in the form of number eight or it multiplicand, Chaotic Clock Models, coupled rotations, vector rotators, mass moment vectors, kinetic pressure, multi-step reductor/multiplier systems, analogy, heavy mass particle motion along rough curvilinear trace with Amontons-Coulomb friction.

Abstract: For examine natural clocks of reductor, as well as source of nonlinear vibrations and noise in its nonlinear dynamics, it is necessary to investigate properties of nonlinear dynamics, and phase portraits, as well as structures of homoclinic orbits, layering and sensitivity of this layering of homoclinic orbits and bifurcation of homoclinic points.
Basic elements of the phase trajectory method, and by analyzing of the types of singular points, phase trajectory curves and total mechanical energy surfaces in phase space, will be presented.

A review of different examples with trigger of coupled three singular points in dynamics of different models of mechanical systems each with one degree of freedom will be presented and analyzed. Trigger of coupled three singular points appear in the phase portrait of dynamics of mechanical system with one degree of freedom and with coupled rotations and mass deviation with respect to the axes of rotations as it is generalized rolling pendulum along curvilinear trace with minimum and maximums in vertical plane. Phase portrait and constant total mechanical energy curves for each of the previous listed models of dynamics are mathematically described and graphically presented and analyzed. A theorem of existence of a trigger of coupled three singular points and a homoclinic phase trajectory in the form of number “eight” will be presented.

Series of phase trajectory portraits with trigger of coupled singular points as results of investigation of nonlinear dynamics of one- as well as multistep geared reductor/multipliers will be presented.
In the Lecture mass moment vectors and vector rotators, introduced by author at ICTAM Haifa 92, are used to present a vector method for the analysis of kinetic parameter dynamics of coupled rigid rotors with deviational properties of mass changeable distribution and with couple rotations. A numerical experiment with the use of derived analytical expressions and of MathCAD program was used to create a visualization of phase portraits of nonlinear dynamics of coupled rotors and the layering of homoclinic orbits with respect to the system parameters change.

Kinetic pressures on bearing of rotors with simple as well as coupled rotations will be presented by deviational components of mass moment vectors and kinematical vector rotators coupled for corresponding bearing and axis of rotation.
Acknowledgements: Parts of this research is supported by the Ministry of Sciences and Technology of Republic of Serbia through Mathematical Institute SASA, Belgrade Project ON174001.

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Эл № ФС77-58560, ISSN: 1727-6942.
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CV

KATICA R. (Stevanović) HEDRIH, (was born August 28, 1944 in Bobovište, Alesinac, Serbia), Full Professor-Scientific Research Full Professor –Project Leader in mechanics (from 1995-) amd Head of Department of Mechaics (2010-2012) in Mathematical Institute SANU Belgrade. Full Professor and the Head of the Chair for Mechanics (1977-1979, 1981-1983, 1986-2004) and Head of Centre of Nonlinear Dynamics and Active Structure (2005-2009-2014), and Project Leader (1975-2009) in period full time working at the Mechanical Engineering Faculty of the University of Niš (period 1967-2009). Academician of Ukrainian High School Academy of Sciences (from 1996-) www.anvsu.org.ua анд Academician of Higher Education Academy of Sciences of Ukraine (from 1996-) http://anvou.org.ua/news/akademia-nauk-visoi-osviti-ukraini-ogolosue-konkurs-na-zdobutta-nagorod-svatogo-volodimira-i-arosla/, Member of Serbian Scientific Society (from 2008-) and Secretary of Department of Natural Sciences and Mathematics at Serbian Scientific Society. Academician of the Academy of Nonlinear Sciences in Moscow (1997-) and Scientific Secretary of Branch in Serbia (Period 1957-2009). Supervisor of numerous Magistar of science thesis and Doctoral dissertations. Author of two monographs, one Monograph paper and numerous published scientific papers and chapter in Scientific books, and also ten university publications.

Katica (Stevanović) HEDRIH, Doctor of Technical Sciences (1975),

Editor-in-chief of the University of Niš scientific journal “FACTA UNIVERSITATIS” http://facta.junis.ni.ac.rs/ (since 1989-2004) and Editor-in-Chief of the Series Mechanics, Automatic Control and Robotics (1990-2008) http://facta.junis.ni.ac.rs/macar/macar.html, present member and associated editor of Journal Tensor (Japan), previously in J. Mathematical Problems in Engineering, Hindawi Publishing Corp.http://www.hindawi.com/ (2004-2017), member of unique Journal Tensor, published and founded before 74 years by Tensor Society in Japan, member of Editorial board of Journal Scientific Technical Review founded 50 years before by VT Serbia, Member of Editorial Board of Vestnik Moskovskogo aviationoga instituta (Print version) and Trudy MAI (online Journal), an was member of Editorial Board of Int. Journal Nonlinear Sciences and Numerical Simulations, Freund Publishing House LTD (1999-2010) and other. Member of GAMM and Tensor Society- Japan, member of International ASME, American Academy of Mechanics and a European Society for Mechanics Member. She is also reviewer and referee of the numerous university scientific publications and papers published by Elsevier, Springer, Hindawi Press, Freund Publishing House and other. Referee of Zentralblatt (with more than 100 reviews). She is the author of the monographies: Vectors of the Mass Moments (1998), Analytical Dynamics of Discrete Hereditary Systems (co-author O.A. Goroshko, 2001). and The Vector Method of the Heavy Rotor Kinetic Parameters Analysis and Nonlinear Dynamics (2001) and one in Vibroumpact dynamics (2016). She was the chief and project-leader of a number of scientific projects in areas of mechanics and mechanical engineering in Serbia and aboard. She is one of co-authors of the research project and a SASA edition-publication - The Life and Work of Serbian Scientists with four published biobibliographies. She is the author of numerous scientific papers, and of university study books and textbooks in the area of Lubear and non-linear Oscillations Theory, Theory of Elasticity, Strength of Materials, Mechanics, Mathematical Physiscs, Philosophy of Natural Sciences, History of Mechanics. She was a supervisor of a number of magisterium of sciences and doctoral dissertations in the area of technical sciences – nonlinear and deformable body mechanics and member od numerous commission for evaluation of the dissertations. Her papers and books were cited many times by WEB of Science and Serbian index Citation, one paper was cited in Springer Monograph by Aly Nayfej in 1976 and two papers were cited important in Monograph: by Yu.A.Mitropolskiy (in Ukraine 1976) and four papers were cited in important ASME AMR for 2010. Her first docorantes are now university professors and Project leader and supervisor of new generation of the Ph. D. students. She was the organizer of two Yugoslav congresses on Theoretical and Applied Mechanics, as well as of a number of minisymposia of international rank (IFNA WCNA, Orlando, 2004; EU FC16-Greece 2006 and APM Saint Petersburg 2007; ESMC Lisbon 2009 and ICDVC Hangzhou 2010, and other.). She attended, with invited lectures or as invited participant, numerous University Mechanics Seminars or Scientific Meetings in the area of nonlinear mechanics in numerous countries in World (in Europe, Asia, both America and Australia).

Honors and Awards: Award Plaque - Best graduate student of generation 1966/67 at University of Niš and Best Thesis of Bachelor's (Master) degree at Yugoslav Faculties of Engineering and Natural-mathematical Sciences, 1967; Important Award Plaque “Archimedes” (“Archimed”) for 2008 by Scientific-Technical Institute of Serbian Army for scientific work and two Award Plaques by Cankaya University, Ankara, Turkey for scientific advances in IFAC FDA Workshop (2008) and for Scientific advances in Nonlinear Dynamics Workshop (2010). Important Award Plaque “Saint Volodimir” (Nagrada Svatoga Volodimira) for 2010 of Ukrainian Higher Education Academy of Sciences.

Professors: Draginja Nikolić, professor of Mathematics, Professor Dr Ing. Math. Danilo P. Rašković, Academician Yuriy Alekseevich Mitropoljskiy, Academician Tatomir P. Andjelić, Professor dr Dragoslav Mitrinović, Profesasor dr Jurij Korobov and other.

http://www.masfak.ni.ac.rs/sitegenius/topic.php?id=409\

http://www.mi.sanu.ac.rs/colloquiums/mechcoll.htm


Оснивање Математичког института

2. **Lecturer**: Ivana Atanasovska
   Afilation: Mathematical Institute SANU
   Data: 19.06.2018.
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.jun2018.php

Lecture: Complex nonlinearity of involute gears dynamics

Keywords: nonlinear dynamics, contact mechanics, involute gears

The basic theory of machines and mechanisms, as well as the illustrations from nature, runs gears as an unsurpassed topic for nonlinear mechanical phenomena research. Gear tooth profile could be formed by different curves. But, the most commonly used are gears with involute profile – with tooth profile in form of curve which is generated when straight line is rolling without slipping over the circle.
Developing of dynamic model of involute gear pair and calculation of main influential parameters are essential for studying the gears stability [1]. A methodology developing for analyzing the dynamic behavior of gear pairs will be presented with algorithm which includes developed procedures for calculation the main gears characteristics with special attention paid to calculations of time-varying contact deformations and mesh stiffness [2].

The new model for vibro-impact dynamics of gears will be also discussed [3, 4]. This mathematical model is applicable in the special cases when tooth profile dimensions and value of transmission ratio could cause a very small difference between pinion tooth thickness and wheel tooth spacewidth. This vibro-impact phenomenon is characterized with vibro-impact vibrations in teeth contact during a short period of time after the collision of pinion tooth and wheel tooth, when the number of teeth pair in contact has been change [5].

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CV

IVANA D. ATANASOVSKA, (was born on 10 June 1971 in Kumanovo, Macedonia) Associate Research Professor, Mathematical Institute of SASA, Belgrade, Serbia. Ivana Atanasovska takes a part as a researcher in the research projects which are coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA) from 2006, Project leader: Prof. Katica (Stevanović) Hedrih. She is a member of the Serbian Society of Mechanics and Society for Structural Integrity and Life, Belgrade. She was the member of research teams in two international research projects started in 2013. One of them is innovation project funding in FP7 framework program and the other is funding by the University Teknologi PETRONAS, Malaysia. She has also the successful collaborations with "School of Aerospace, Mechanical and Manufacturing Engineering RMIT University, Melbourne, Australia", Faculty of Mechanical engineering, University of Maribor, Slovenia, as well as with Manipal University, Jaipur, India.

She was studying on the Department for Process Engineering and graduated in 1994 with graduate thesis in Machine elements. She worked at the Faculty of Mechanical Engineering, University of Kragujevac at the position of Graduate Research Assistant in the Department of mechanical construction and mechanization from 1995 to 1997. In this period she worked in the scientific research projects funding from The Ministry of science, technology and development of Republic of Serbia, and gave the contribution in the preparation and carrying out the practice in teaching courses: Machine elements, Calculations of mechanical constructions and Design methods. She received the M.Sc. degree in 1999 from the Faculty of Mechanical Engineering, University of Kragujevac, from the Department of mechanical construction and mechanization. The Ph.D. degree received in 2004 from the Faculty of Mechanical Engineering, University of Kragujevac under the supervision of Prof. Vera Nikolic Stanojevic. The title of her Ph.D. thesis was: "Influence of load distribution on the load capacity of involute cylindrical gears".

From December 1997 to 2005 she worked at different professional positions in mechanical engineering and through different practical tasks developed the competence for carrier of scientist and researcher who successfully connected the research tasks and practical implementation. She worked in this period in the Agency for Recycling of Ministry of life environment protection of Republic of Serbia, as well as in Unit for publishing in PE POST "Serbia".

Ivana Atanasovska received her Ph.D in June 2004 and then appointment for Assistant Professor in Department for information technologies in Faculty of Management in industry, Serbia. From 2006 to 2014 worked at the position of Assistant Research Professor in Institute for material testing, Belgrade and Institute "Kirilo Savic", Belgrade, Serbia. From September 2014 to May 2016 worked in the Innovation center of the Faculty of Mechanical engineering, University of Belgrade. In December 2014 she received scientific title Associate Research Professor and from May 2016 works in the Mathematical Institute of the Serbian Academy of Sciences and Arts. She is dedicated to the science and research activities and to the application of numerical methods and applied mechanics in the real engineering problems. Last years she focuses the research activities on nonlinear phenomena and nonlinear dynamics of real mechanical systems. Also, significantly motivates young researchers and professional staff in the current and past professional positions in their research.

Ivana Atanasovska published more than 100 papers as author or co-author, among them: more of 15 papers in international journals and significant number in national journals, with citations in international and national journals indexed in reference bases. She is the reviewer in leading international journal in the area of machine elements and mechanisms *Scientific Journal Mechanism and Machine Theory, published by Elsevier*, as well as the member of the international editorial board of the *International Journal for traffic and transport engineering (IJTTE).* Also, she was a member of the organization committees of few national and international scientific conferences. Ivana Atanasovska is president in Commission for machine safety and permanent member in Commission for technical drawing in Institute for standardization in Republic of Serbia.

http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php

http://www.mi.sanu.ac.rs/novi_sajt/research/seminars/mechanics_machines_mechanisms.php

3. **Lectureрезиме**: Dušan Zorica
   Afilation: Mathematical Institute SANU and Natural-Mathematical Faculty University of Novi Sad
   Dara: 09.10.2018.
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.oct2018.php

Lecture: Non-local and memory effects in the dynamic stability analysis of rods

Lateral vibrations of a simply rod loaded by an axial force of constant intensity and positioned on a foundation are the subject of analysis. The main goal in dynamic stability analysis is to determine the conditions that guarantee stability, i.e., conditions under which the rod will vibrate with constant or decreasing amplitude.
First, Bernoulli-Euler moment-curvature constitutive equation, describing elastic material the rod is made of, is assumed. The rod-foundation interaction is modeled by the complex-order fractional Kelvin-Voigt model of the viscoelastic body, with the restrictions on model parameters following from the Second law of thermodynamics.

Second, Eringen's type moment-curvature constitutive equation, describing the material of the rod that shows non-local effects, is assumed. This type of non-locality is usually associated with nano-rods. The foundation shows Pasternak and viscoelastic type properties. Thus, rod-foundation interaction is modeled through rotational elastic springs, describing the foundation ability to influence the curvature of the rod and through general rheological model of the viscoelastic body corresponding to the distributed-order constitutive equation.

The solutions to problems are obtained by the separation of variables method. The critical value of axial force, guaranteeing stability, is determined. The influence of various model parameters on the value of critical axial load is examined.
This talk aims to review and summarize the dynamic stability problems analyzed in the cooperation with T.

Atanacković, M. Janev, S. Konjik, B. Novaković, S. Pilipović and Z. Vrcelj.

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CV

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2003 – 2006	Факултет техничких наука, Универзитет у Новом Саду – одбрањена магистарска теза:

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1996 – 2001	Природно-математички факултет, Универзитет у Новом Саду – звање дипломирани физичар
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2015 – ... ванредни професор – Департман за физику, Природно-математички факултет, Универзитет у Новом Саду
2011 – 2015 научни сарадник – Математички институт Српске академије наука и уметности, Београд
2009 – 2011 доцент – Грађевински факултет у Суботици, Универзитет у Новом Саду
2006 – 2009 асистент – Грађевински факултет у Суботици, Универзитет у Новом Саду
2002 – 2006 асистент-приправник – Грађевински факултет у Суботици, Универзитет у Новом Саду
2001 – 2002 хонорарни сарадник – Грађевински факултет у Суботици, Универзитет у Новом Саду

Учешће на пројектима:

- 2011 – ... Пројекат Министарства за науку Републике Србије, „Вискоеластичност фракционог типа и оптимизација облика у теорији штапова ”, број 174005. Од 2014. руководилац пројекта.
- 2011 – ... Пројекат Покрајинског секретаријата за науку и технолошки развој, „Методе функционалне анализе и фракциони рачун са применама у механици“, број (114−451− 084), руководилац: проф. др Сања Конјик.
- 2006 – 2011 Пројекат Министарства за науку Републике Србије, „Савремени проблеми механике деформабилног тела”, број 144019), руководилац: академик Теодор Атанацковић.




4. **Lecturerзиме**: Anđelka Hedrih
   Afikation: Mathematical Institute SANU
   Data: 16.10.2018.
   Lecture: **Modeling coupled oscillatory mechanicsm with phase-delay**
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.oct2018.php

Coupling oscillators are present in industry, engineer and biological systems. Way of their coupling, strength of coupling will affect their dynamics and stability. We model a complex structure that consists of four coupled oscillators with viscoelastic properties and phase-delay. Visco-elastic properties of coupled oscillators were modeled using differential equations with fractional derivatives. We investigated how different phase-delay of this coupled mechanical system is related with phenomenon of dynamical absorption and resonance and stability of the system.

Acknowledgements: This work was supported by Ministry of Education, Sciences and Technology Development of Republic of Serbia through Mathematical Institute SASA, Belgrade Grant ON174001 “Dynamics of hybrid systems with complex structures, Mechanics of materials”.

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CV

ANDJELKA N. HEDRIH, (was born on 21st October 1978 in Nis, Serbia)
Assistant Research Professor, Mathematical Institute of SASA, Belgrade, Serbia.

Andjelka Hedrih takes part as a researcher in the research project “Dynamics of hybrid system of complex structures. Mechanics of Materials.” No147001 (2011-), financed by Ministry of Education, Science And Technological development of the Republic of Serbia, coordinated through Mathematical Institute SANU. Head of the project is Katica (Stevanović) Hedrih, Mathematical Institute SANU.
From January 2006 to October 2009. she was working as a scholarship researcher of Ministry of Science of the Republic of Serbia on the project: “Interaction of immobilized cells, tissues and biologically active molecules in bioreactor systems." No: 142075. Head of project was Branko Bugarski, professor at the Faculty of Technology and Metallurgy, University of Belgrade. She is a member of the Serbian Society of Mechanics and European Society of Mechanics and Serbian Chamber of Medicine. Her research interests are in the area of biomechanics, reproductive biomechanics, modeling of biological systems, regenerative medicine, DNA elasticity, ageing phenomena, chaos in biological systems, non-linear dynamics of biological systems.
She graduated in 2005 at the Faculty of Medicine of the University of Niš. She obtained a PhD in Multidisciplinary scientific field: Biomedical engineering and technologies at the University of Belgrade, Serbia in 2016. Title of the doctoral thesis was “Oscillatory behavior of mouse Zona Pelucida before and after fertiization“ co-supervised by prof. dr Mihailo Lazarević, Faculty of mechanical engineering, University of Belgrade, Serbia and prof.dr Ana Mitrović-Jovanović, Medical Faculty, University of

Belgrade, Serbia. She is working on her second PhD thesis titled "Correlation between chromosomal instability and elastic properties of DNA in peripheral blood lymphocytes in healthy females of different age" which was approved by the Faculty for Medical sciences, University of Kragujevac, Serbia.
She received the EUROMECH ENOC Young Scientist Prize in 2011, La Sapienza University Rome, at 7th European Nonlinear Dynamics Conference, 26-29. July 2011, Rome. During her studies she received a number of scholarships from governments of Serbia, Norway and Austria *(OeAD-GmbH*). She spent one month at the Institute of Biophysics at Johannes Kepler University Linz in prof. Peter Hinterdorfers' group in order to image human DNA with AFM microscope. She completed a number trainings on various topics in medicine and biomechanical Engineering at various institutions in Serbia and Russia. Since 2011 she participated in every ENOC (Europiean nonlinear dynamics conference) conference with oral presentations. In St. Peterburg and Schenchen, she gave invited lectures in biomechanics. She participated at ICTAM (International congress oftheoretical and applied mechanics) 2012 in Bejingand ICTAM 2016 in Montreal. She was working as a student assistant for practical lectures for medical students in Pathology, Medical Faculty University of Nis, Serbia in 2002. From February -Jun 2008 she was working as an assistant- PhD student for Anatomy and Physiology for Engineers, Mechanical Faculty University of Belgrade, Serbia. She spend three months in 2008 in INEP (Institute for nuclear energy application), Zemun, Serbia working on a project Encapsulation of human sperm in alginate polymers. From 2009 to 2016 she worked at the Department for biochemical and medical science, State University of Novi Pazar, Novi Pazar, Serbia as a teaching assistant delivering exercises in a number of courses in the area of bioengineering and rehabilitation: Bioengineering, Clinical Biomechanics, Rehabilitations of children with special needs, Programing in rehabilitation, Rehabilitation in sport, Diagnostics of sport injuries, Professional rehabilitation, Balneoclimathology, Kinezi-therapeutic techniques, Diagnostics in kineziological education, Physical medicine, Introduction to Rehabilitation.
From October 2016- she is working at the Department of Mechanics, Mathematical Institute of Serbian Academy of Sciences and Arts, Belgrade, Serbia.





5. **Lecyurer**: Aleksandar Obradović
   Afilation: Facukty of Mechanical Engineering University of Belgrade
   Data: 30.10.2018.
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.oct2018.php

Lecyure: FREE VIBRATION ANALYSIS OF AXIALLY FUNCTIONALLY GRADED TAPERED, STEPPED, AND CONTINUOUSLY SEGMENTED RODS AND BEAMS

This article [1] is a continuation of research in papers [2] and [3]. In this paper a new non-iterative computational technique referred to as the symbolic-numeric method of initial parameters (SNMIP) is proposed. The SNMIP represents a modification of the iterative numeric method of initial parameters in differential form known in the literature. The SNMIP is applied to study free vibrations of Euler-Bernoulli axially functionally graded tapered, stepped, and continuously segmented rods and beams with elastically restrained end with attached masses. Both the longitudinal vibration of rods and transverse vibration of beams are considered. The influence of the attached masses and springs on the natural frequencies of vibration of axially functionally graded rods and beams is examined. The validity and accuracy of the method are proven through the comparison with the known results in the available literature. The subject of this research in the following articles will be applied to Timoshenko's beams as well as to cases of longitudinal and transverse oscillations coupled across boundary conditions.

REFERENCES

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[2] Obradović A., Šalinić S., Trifković D., Zorić N., Stokić Z, Free vibration of structures composed of rigid bodies and elastic beam segments,Journal of Sond and Vibration,ISSN: 0022-460X, Vol. 347, pp. 126–138, 2015.
[3] Tomović A., A Novel Approach to the Free Axial-Bending Vibration Problem of Inhomogeneous Elastic Beams With Variable Cross-Sectional Profiles, S3c, Proceedings of the 6th International Congress of Serbian Society of Mechanics, Tara, 2017.

CV

Dr. Aleksandar Obradović, Full Professor, was born on 31 July 1962 in Užice. He graduated from the Faculty of Mechanical Engineering, University of Belgrade, in 1987. He received his Master's Degree in 1990 after the defense of the thesis "Optimal control of the motion of the system of rigid bodies", and received his PhD degree in 1995 after the defense of the dissertation "Singular optimal control of mechanical systems" at the Faculty of Mechanical Engineering, University of Belgrade. Master's thesis and doctoral dissertation were carried out under the mentorship of Prof. Dr. Josif Vuković.
The candidate started working at the Chair of Mechanics, Faculty of Mechanical Engineering, University of Belgrade, in 1988, and was elected to the title of the full professor for narrow scientific field of Mechanics in 2010. He conducted all forms of teaching and exercises in all subjects of the scientific field of Mechanics at bachelor and master studies at the Faculty and Military Academy, as well as lectures at postgraduate and doctoral studies in subjects: Small oscillations of systems, Oscillations of elastic bodies, Oscillations in military engineering and Oscillations of mechanical systems. Professor Aleksandar Obradović is a mentor for two doctoral and two master's theses. He co-authored one elementary and four auxiliary textbooks in Mechanics. In the period 2000-2004 he performed duty of Vice-Dean for Finances for the duration of two mandates. From 2004-2014 he was Editor-in-chief of all publications of the Faculty of Mechanical Engineering, University of Belgrade.
The fields of scientific-research fields that the candidate has been involved in so far are: optimal control of the motion of mechanical systems, dynamics of the systems of rigid and elastic bodies and stability of motion of the mechanical systems, along with a smaller number of papers related to the application of the theory of oscillations to technical facilities.
In 1990 he was awarded the prize Dr. Rastko Stojanović by the Yugoslav Society of Mechanics.
Since 2018 Professor Aleksandar Obradović is a corresponding member of the Serbian Academy of Nonlinear Sciences. He is a member of the Home Scientific Committee of the Ministry of Education, Science and Technological Development of the Republic of Serbia for mathematics, computer science and mechanics (2017-2022). He is also a member of Editorial Board of the journal Theoretical and Applied Mechanics (TAMM).

6. **Lecturer**: Milan Cajić
   Afulation: Mathematical Institute SANU
   Data: 20.11.2018.
   Lunk:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.nov2018.php
   Lecturer: **Vibration of nonlocal elastic and fractional viscoelastic beams with attached masses using two different methods**

In this presentation we will observe the free vibration models of beams with attached masses using two different methods. In the introduction, a history of beam-mass models will be reviewed and compared with respect to modern approaches. Exact method based on compatibility conditions will be presented for the nonlocal fractional viscoelastic nanobeam with a single attached mass. This example will serve to validate more general nanobeam model with attached arbitrary number of masses and influenced by the external magnetic field that is solved via approximate method and analyze in complex and time domain via integral transform methods. Advantages and deficiencies of both models will be emphasized in the conclusion.

Acknowledgment: The presented results are achieved on the project OI 174001 “Dynamics of hybrid systems with complex structures. Mechanics of materials”, leader Prof. dr Katica (Stevanović) Hedrih

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CV

Milan Cajić is currently Research Assistant Professor at the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA). He is working as a researcher on the National Research Project 174001 entitled "Dynamics of hybrid systems with complex structures. Mechanics of materials", which is coordinated by the Mathematical Institute of SASA from 2011, Project leader: Prof. Katica (Stevanović) Hedrih. He is the member of the research team in bilateral project of researcher mobility between Serbia and China coordinated by the Mathematical Institute of SASA and Hohai University, College of Mechanics and Materials, which started in 2018. He is the member of the Serbian Society of Mechanics and associated member of the International Union of Theoretical and Applied Mechanics (IUTAM). Milan Cajić was born on 29 March 1984 in Niš, Serbia. He finished his primary education at "Vuk Stefanović Karadžić" school in the village of Gornji Matejevac near Niš. He finished his secondary education in 2003 at "Nikola Tesla" school of Electrical Engineering in Niš. He started his studies at the Faculty of Mechanical Engineering, University of Niš in 2005 and finished in January 2011 with graduate thesis in Mechatronics. After the graduation he started his PhD studies at the Faculty of Mechanical Engineering, University of Belgrade and earned his PhD in 2017 with thesis "*Modelling of complex fractional order hybrid structures and application in dynamics of systems of rigid and deformable bodies*", under the supervision of Prof. dr Mihailo Lazarević.

In 2011, he started working as Research Assistant Trainee at the Mathematical Institute of SASA and as Research Assistant in 2012. He attended and participated in numerous of seminars on mechanics, history of science and mathematics, lectures for young researcher held by the leader of the project 174001 and other activities organized at the Mathematical Institute. He gave several presentations on his research work at the meetings of the Department of Mechanics of the Mathematical Institute of SASA. His research was focused on application of fractional calculus based mathematical models in mechanics of rigid multibody systems and structural mechanics accounting viscoelastic and dissipation properties in the dynamic behavior of such mechanical systems. His research also included development of models accounting different physical and size effects using analytical, approximate and numerical methods of solution. Recently, his research focus switched to nonlinear dynamics and wave propagation phenomena in structural and periodic mechanical systems. He was appointed for Research Assistant Professor in 2018. In the final year of his graduate studies, he won IAESTE (The International Association for the Exchange of Students for Technical Experience) scholarship for student exchange. Within this scholarship, he spent three months at the Institute of Engineering Mechanics, Department of Continuum Mechanics at the University of Karlsruhe in Germany. During this traineeship, he dealt with the implementation and simulation of models based on monocrystalline material dislocations. In 2013, he received a one-month scholarship by the WUS Austria to visit the Institute of Biomechanics at the Graz University of Technology, Austria. In 2017, he traveled to China to visit the College of Mechanics and Materials at Hohai University in Nanjing. This visit was a part of the researchers mobility program within the bilateral cooperation project between Serbia and China coordinated by the Faculty of Mechanical Engineering, University of Belgrade and Hohai University. He developed a strong collaboration with researchers from different institutions in Serbia and abroad, which resulted in several co-authoring publications in recognized international journals and conferences.

Milan Cajić published 14 papers in international journals, 5 papers in national journals, more than 20 papers in national and international conferences and 1 national monograph also having more than 270 citations according to Google Scholar. He was the reviewer in leading international journals such as *Applied Mathematical Modelling, European Journal of Mechanics - A/Solids, Composites Part B, Microsystem Technologies, Iranian Journal of Science and Technology, Physica B.* In 2017, he was one of the organizers of the mini-symposium "Nonlocal theory of mechanical structures" supported by the Mathematical Institute of SASA and project 174001.

http://www.mi.sanu.ac.rs/~mcajic/
http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php

7. **Lecturer**: Mihailo Lazarević
   Afilation: Facukty of Mechanical Engineering University of Belgrade
   Data: 27.11.2018.
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.nov2018.php
   Lecture: **Applications of (non)-integer calculus on advanced modeling and control of (bio) mechanical systems: New results**

In recent years**,** there have been extensive research activities related to applications of fractional calculus i.e. calculus of non-integer order in nonlinear dynamics, mechatronics, bioengineering as well as control theory. On the other hand, in many systems in nature are inherently under-actuated, with fewer actuators than degrees of freedom. Double inverted and cart inverted pendulum present well-known models of corresponding biomechanical systems and they are highly nonlinear mechanical systems with one control input and two degrees of freedom. Stability problem of two previous types of inverted pendulum controlled by a non-integer order PD controller in combination with partial feedback linearization technique is studied. Determining its stability regions in parameters space of a fractional order PD controller is studied and presented.

Also, it is presented the procedure of mathematical modeling of an exoskeleton systems for rehabilitation with three DOFs and 4 DOFs using the Rodriguez method and synthesis of a iterative control law with two closed loops. Particularly, a new open-closed-loop PIDD2 /PID type iterative learning control (ILC) is studied for joint space trajectory tracking control of time-varying NeuroArm robot robotic manipulator. We propose control system which consists of a computed torque controller for linearizing robot dynamics. Then open-closed ILC is applied to the linearized system to further enhance tracking performance for

repetitive tasks and deal with the model uncertainties. It is theoretically proven that the boundednesses of the tracking error are guaranteed in the presence of model uncertainty. Further, we investigate and suggest an open-closed-loop of fractional order P/P Dalpha type iterative learning control (ILC) for fractional order singular complex system. Sufficient conditions for the convergence in time domain of the proposed fractional order ILC for a class of fractional order singular system are obtained. Finally, numerical examples are presented to illustrate the effectiveness of the proposed open-closed ILC scheme of non-integer order for a class of non-integer order singular complex system.

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CV

Mihailo P. Lazarević was born in July,1964 in Belgrade,Serbia. He received four degrees from Belgrade University: B.Sc. in Mechanical Engineering (*aerospace*), B.Sc. in Electrical Engineering, M.Sc. in Control and System Science Engineering, and Ph.D. in Mechanical Engineering, (*robotics*). From 1996 to 2001 he worked as assistant at the University of Belgrade, Faculty of Mechanical Engineering - Department of Mechanics. He became Assistant Professor in 2001 and Associate Professor in 2005. Since 2009 he is Full Professor at the same Faculty. He published one international monograph*, 8* national monographs, 4 chapters in international monographs, 28 articles in leading international journals (SCI list), 25 articles in international journals, 29 articles in national journals, 117 articles in the proceedings of international meetings, conferences and symposiums, 33 papers published in proceedings and presented at the national meetings, conferences and symposiums,1 book and 2 handbooks as collections of solutions and solved problems, all for the necessities of students of Faculties of Mechanical Engineers.

His scientific research of can be divided into several thematic areas. His first research interest was in the field of dynamics of spatial rigid/solid multibody systems (including mathematical modeling and control of robotics and biomechatronics) and dynamics of complex systems. Other areas of occupation are concerned with theory of electroviscoelasticity, rheology and synergetics. In the last decade, permanent occupation of the author was devoted to the applications of „new generalized" differo-integral calculus also known as fractional calculus (FC). Especially, his interest is devoted to the in-depth analysis of ideas of fractional derivatives and integrals to modeling and control of (bio)mechanics/adaptronic/systems on several scales. In addition, a wide range of topics of his interest are in applications of fractional calculus in advanced control issues (PID control, iterative learning control and sliding mode control of fractional order), as well as recent application of fractional calculus in mechanics of nanostructures. According to Scopus, he has over 669 citations and his H index is 12; h-index 16 and i10-index is 22 (Google Scholar).He served as the reviewer of respectable international journals and for several international /national conferences and congresses (FDA,CHISA,SSM). He participated in ten developmental, fundamental, technological and innovation research projects in and for Ministry of Education, Science and Technological Development of the Republic of Serbia.Prof. M. Lazarević, also, participated and leaded in one international research project (EUREKA) and bilateral cooperations (FERI Univerza u Mariboru,Slovenia (2010-2011), Nanjing University,China (2016-2017),(2018-), as well as academic programme links - ERASMUS Mundus (2011,2014). He was a supervisor or a member of commission for over 30 diploma works, 3M. Sc. Thesis and 10 Ph. D. dissertations,(supervior of 4 Ph. D. dissertations).

He is member of the Serbian Society of Mechanics and IUTAM. Since July 2015 he is acting as the President of the Serbian Society of Mechanics. Since 2009, he is Chief of the Laboratory of Applied Mechanics of the Faculty of Mechanical Engineering, Belgrade University. He is a member of the editorial board of the journal Theoretical and Applied Mechanics.Since January 2018, he is also a member of the editorial board of the journal Scientific Technical Review.He received the award of the Foundation Andrejević for 2003 in the field of Robotics. He was awarded Award Plaque for 2011 by Scientific-Technical

Institute of Serbian Army for scientific work.Also, he was awarded the prize for “Best Oral Presentation” at the 2012 Symposium on Fractional Differentiation and Its Applications (FDA’ 2012), Hohai University, Nanjing./

8. **Lecturer**: Danilo Karličić
   Afulation: Mathematical Institute SANU
   Data: 04.12.2018.
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.dec2018.php
   Lecture: **Dynamic stability of nonlocal beams and plates**

In general, dynamic stability analysis of structures elements such as beam, plate and shells can play a significant role in design procedures of future mechanical and civil structures. For example, in axially loaded beams, where loads are time-dependent harmonic functions, a failure may occur due to dynamic instability might be much smaller than the failure induced by static buckling. These instability conditions usually lead to the failure of micro devices or macro engneering structures. Based on that fact, in this presentation we will show how to analyse stability regions caused by primary parametric resonance, where the frequency of excitation is two times larger than the first natural frequencies of beam/plate in framework of nonlocal elasticity theory. By considering the Euler–Bernoulli beam theory, nonlocal constitutive relation and von Karman nonlinear strains, we obtain a system of nonlinear partial differential equations of motion. Single-mode Galerkin discretization will be employed to obtain a system of *m* nonlinear differential equations that will be solved using the IHB method in order to obtain semi-analytical periodic solutions of the nonlinear system. Moreover, the stability of periodic solutions will be examined by introducing the Floquet theory. In the second part of this presentation we will discuss about stochastic stability of nonlocal beams and plates in linear regimes. By introducing the perturbation method and definition of the stochastic stability such as the moment Lyapunov exponent, we will show how the approximate analytical solution of the p-th moment Lyapunov exponent is obtained. In addition, we use results for the *p*-th moment Lyapunov exponent to analyse the moment and almost-sure stability boundaries of a presented stochastic dynamical systems. At the end of the presentation we will show influence of small-scale on the on the dynamical behaviour of the presented models.

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CV

Danilo Karličić was born on 31th October 1986 in Niš, Sebia. He graduated from the University of Niš, Faculty of Mechanical Engineering in 2010 and started working at the Mathematical institute of SASA, Department of Mechanics at the beginning of 2011. In 2016, he defended his doctoral dissertation entitled „ Application of nonlocal continuum theory in the analysis of the dynamic behaviour and stability of coupled nano-structures systems.” at the University of Niš. He was awarded with three prestigious fellowships for postdoctoral research: 1) Serbian Government fellowship, 2) Alexander von Humboldt fellowship – Germany, 3) Marie Skłodowska-Curie Individual Fellowship–EU. He is the author of 23 papers in scientific journals from the ISI list and one international monograph published by John Wiley & Sons, Inc.

9. **Lecturer**: Priject Leader Katica (Stevanović) Hedrih and researchers of Team of Project 174001 Dynamics of hybrid systrms with complex structures
   Afilation: Mathematical Institute SANU
   Dara: 18.12.2018.
   Lecture: Presentation of the research results: Project 174001 (2011-2018) Dynamics of hybrid systems with complex structures. Mechanics of materials
   Link:
   http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.dec2018.php

The project has produced original scientific results in the following themes:

1. Elements of mathematical phenomenology and applications (in Mechanics, in nonlinear dynamics in general, in integration of scientific knowledge in reduction of number of models of dynamical systems).
2. Analytical mechanics of discrete fractional order systems; Derived a series of theorems.

3. Nonlinear and rare phenomena in dynamics of hybrid systems with coupled structures of rigid and deformable bodies; Transfer of energy through a system and subsystems; Synchronization of subsystems.
4. Models of biodynamical oscillators; Phenomenon of transfer of signals, information and energy through their complex structures; Oscillations of DNA helix chains and discrete continuum models of Zone Pelucida, a biomechanical oscillatory model of the mitotic spindle.
5. Mechanics of discrete continuum models. Dynamics of coupled structures of deformable bodies and discrete continuum layers with different constitutive relations: Linear elastic, nonlinear elastic, visco-elastic, hereditary and fractional order properties.
6. Phenomenon of dynamics of systems with friction and vibro-impact system; Theory of collision of rolling bodies; Dynamics of billiards.
7. Mechanics of damage and fracture.
8. Control of systems with delay and theorems of stability.
9. Continuation of doctoral research in accordance with scientific based themes by younger PhD students. 13 PhD students, younger than 30 years of age, are included in the project team and its scientific research. All of them were participants of the two year seminar. So far, 13 PhD students completed all courses at doctoral study programs; 11 candidates defender their doctoral dissertations.

Other topics considered in the framework of the project are: nonlinear transformation, rheonomic system, nonholonomic constraints, mass moment vectors, gyro-rotor dynamics, approximation, amplitude-frequency characteristic, stability, synchronization, theory of collision, vibro-impact system, dynamics of billiards, energy analysis, non-local theory and applications, biomechanical oscillators, control motion. The project collaborators participated in the conferences ENOC 2011, 2014 and 2017, IUTAM ICTAM 2012 and 2017, ESMC 2012 and 2018, EURODYN 2017, Mini-symposium Nonlinear Dynamics 2012, 2014, 2015 and 2017, etc. A member of the project was awarded EuroMech Young scientific prize Roma 2011.
Number of Doctoral dissertations defended by members of Project team is 11.

with participations of the following researchers of the Team Project ON174001:

Following researchers of the Project team presented original scientific results in period 2011-2018:
dr Ivana Atanasovska
dr Sreten Stojanović i dr Dragutin Debeljković - Group presentation
dr Nataša Trišović
dr Ljubunko Kevac
dr Danilo Karličić, dr Milan Cajić, Nikola Nešić i Marija Stamenković -Atanasov - Group presentation
dr Anđelka Hedrih
dr Dragomir Zeković, dr Radoslav Radulović
dr Katarina i dr Stevan Maksimović
dr Marija Mikić i dr Julka Knežević Mijanović
doktorant Stepa Paunović
dr Julijana Simonović (postdoctoral study at Cardif University)

Without presentation:
dr Jelena Đoković i dr Slobodanka Boljanović
dr Ivica Čamagić i dr Srđan Jović – (Kosovska Mitrovixca activity)
dr Tomislav Petrović(Retaied), dr Ljiljana Veljović (Retaied)
Photo of the researchers:
Home page of the Project activities: http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php.

10. **Lecturer**: Gordana Kastratović
Afilation: Facukty of frafic University of Belgrade
Dara: 22.01.2019.
Lecture: **Numerical computation of stress intensity factors of supporting aero structures with multiple site damage**
Link
http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.jan2019.php

Multiple site damage (MSD) represents the simultaneous development of fatigue cracks at multiple sites in the same structural element. It often occurs in longitudinal and circumferential riveted lap joints in wings and fuselages, and can be very serious, because of possible link up of adjacent cracks creating one large crack that can cause catastrophic failure. The prediction of crack-growth rate, residual strength and fatigue life in the presence of MSD, requires accurate calculation of the Stress Intensity Factors (SIFs) at each crack tip. The problem becomes more difficult when crack propagation has to be treated and therefore successive calculations are required. As technology and computer sciences became more available, numerical computational methods had become an indispensable tool for SIFs determination, but they remain a challenging problem in computational fracture mechanics. This presentation embodies an effort to explore and to demonstrate the capacity, performances and difficulties of SIFs determination by usage of some widely available numerical computational methods. The stress intensity factors for several aero structural configurations with MSD were considered by using three different computational methods: finite

element method (FEM) with singularity elements, extended finite element method (X-FEM), and the approximate method based on superposition. This talk represents a review of investigations carried out in cooperation with A. Grbovic, N. Vidanovic and A. Sedmak.

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CV

GORDANA M. KASTRATOVIĆ (was born on 12 January 1973 in Belgrade, Serbia)

Full Professor, Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia.

Gordana Kastratović is a Full Professor and the Head of the Department of Technical Sciences (2015 -) at Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia, where she hold lectures and in Mechanics, Strength of Materials and Fluid Mechanics. She also takes a part as a researcher in the research project, which is coordinated by Faculty of Technology and Metallurgy, University of Belgrade from 2011, Project leader: Prof. Marko Rakin. She is a member of the Serbian Society of Mechanics and Society for Structural Integrity and Life, Belgrade.

She enrolled the Faculty of Mechanical Engineering, University of Belgrade, Department of Aeronautical Engineering and graduated in 1997. with graduate thesis in Flight mechanics. Since February 2001, she has been employed at the Faculty of Transport and Traffic Engineering, University of Belgrade, first as a part-time associate, and since April of the same year, she has been chosen as an assistant in field Mechanics and Mechanics of Fluids at the Department of Technical Sciences. In this period, she worked in the scientific research project funded by The Ministry of science, technology and development of Republic of Serbia, and gave the contribution in the preparation and carrying out the practice in teaching courses: Mechanics, Strength of Materials and Fluid Mechanics. She received the M.Sc. degree in 2003 at the Faculty of Mechanical Engineering, University of Belgrade. She defended hers Phd degree in 2006 at the Faculty of Mechanical Engineering, University of Belgrade under the supervision of Prof.dr Ilija Krivošić. The title of her Ph.D. thesis was: ”Determination of stress intensity factor of supporting aero structures with multiple site damage”. From 2006 to 2008 she was engaged as lecturer in the field of Fluid mechanics at the Military Academy in Belgrade, Serbia. Also, she was a member of the organization committee of one national and international scientific conference.

Gordana Kastratović received in 2007 her appointment as Assistant Professor in Department of Technical Sciences in Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia. Since October 2013 to July 2018 she was employed when she was elected as Full Professor in the field of Mechanics and Fluid mechanics at Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia. She is dedicated to the science and research activities and to the application of numerical methods and applied mechanics in the real engineering problems. Gordana Kastratović was a member of several commissions for evaluation of the dissertations. She is also a co-author of four textbooks for the students of the Faculty of Transport and Traffic Engineering, University of Belgrade.

Gordana Kastratović published more than 40 papers as author or co-author, among them more than 10 in international journals and significant number in national journals, with citations in international and national journals indexed in reference bases. She is the reviewer in leading international journals in the area mechanics and mechanical engineering: *Aerospace Science and Technology published by Elsevier*, *International Journal of Solids and Structures published by Elsevier*, *Advances in Engineering Softwar published by Elsevier, Meccanica, published by Springer Netherlands*, *FME Transactions published by Faculty of Mechanical engineering, University of Belgrade* and *Thermal Science published by Vinča Institute of Nuclear Sciences, Belgrade*.

http://old.sf.bg.ac.rs/index.php/en-GB/members-of-department1/kastratovi-dr-gordana

11. **Lecturer**: Stevan Maksimović
Afilation: Military Technical Institute of Serbian Army in Belgrade
Data: 29.01.2019.

Lecture: Total fatigue life estimation of aircraft structural components under load spectrum

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.jan2019.php

This work is focused on developing computation procedure for strength analysis of aircraft structures with respects to fracture mechanics and total fatigue life estimation. For that purpose here will be considered computation procedures for total fatigue life estimation of constructions under cyclic loads of constant amplitude and load spectrum. The finite element method (FEM) allowed the prediction of the point of crack initiation and the crack propagation using the orientations of the maximum principal stresses. Stress intensity factor (SIF) is the base parameter in strength analysis regarding fracture mechanics. For correct determination SIF in this work special singular finite elements will be used. An special aspect of this investigation is based on application of Strain Energy Density (SED) method in residual life estimation of structural components with initial cracks. Verification of computation procedures for life estimations will be supported with corresponding experimental tests for determination low cyclic fatigue properties of materials and corresponding parameters of fracture mechanics including fatigue tests of representative aircraft structural components.

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CV

STEVAN M. MAKSIMOVIĆ, Corresponding Member of the Academy of Engineering Sciences of Serbia since 2007., was born in Lončari - Brčko on August 12., 1948., Republic Serbish) Full Professor and Senior Scientist.

He finished the high school in Brčko in 1967. He graduated from the Faculty of Mechanical Engineering, Department of Aerospace/aeronautical engineering, in Belgrade in 1973. He graduated from postgraduate studies from 1973. to 1975. in the field of aeronautical structures at the Department of Aerospace Engineering of the Faculty of Mechanical Engineering in Belgrade. At the same department he defended his PhD thesis entitled „Problems of Nonlinear Behavior Behavior of Anisotropic Multilayer Structures in Aerotechnique by Using of Finite Element Method“. Since 1973. up to his retirement in 2013. he was working at Military technically Institute Žarkovo, in Belgrade. In the period from 1973. to 1976. he participated in the testing of static strength of aircraft structures of aircraft „ORAO“. Since 1976, he worked in the Department for calculating the stress/strength of the hull structure of the serial airplane „ORAO“ and airplane „G-4“ Supergaleb. During 1978, he was appointed chief of the Department of the calculation of strength of the fuselage structure of aircraft, where, in addition to the strength structure of the aircraft structure, he continued to develop methods and application software in the field of Structural Analysis and Structure Optimization, primarily on the basis of FEM. As a result of the research, the software package "SAMKE" was developed. During the period from 1985. to 1986. he co-operated with the British aerospace company Airbus and the French company Marcel Dassault on supersonic aircraft project. In addition to the development projects on which he worked and guided all aspects of securing the strength of the structure (ORAO and G-4 Super galeb, unmanned aircraft made of composite materials "Large Model" IL-114 for tunneling tests - for Russia's needs,

extension of the life span of aircrafts JASTREB and GALEB who were exploited in Libya, he led the three research projects of the VTI in period from 1980. to 1990.: (1) Aerospace structure project made of composite materials, (2) Designing of integral reservoirs in the fuselage, (3) Research in the field of nonlinear structural analysis and aircraft structure optimization using finite element method (FEM). During 1991. Stevan Maksimovic was appointed Chief of Department for strength calculation (computational and experimental) of Aircraft Structure in which he was until 1913. During this period, he worked on several development projects, the most important of which are LASTA-2 and LASTA-3 aircraft, the modernization of the G-4 aircraft, the introduction of a system for passive interference with all types of combat aircraft and helicopters in Serbia, led by prolonging the life span of our aircraft which are in exploitation in the country and abroad (Myanmar 2013./2014.), as well as design and experimental verification of the strength of helicopter blades of composite materials. He headed eight research and development projects financed by the Ministry of Defense. He visited MIRCE Akademy Exeter and Pisley Colege in Glasgow several times as a visiting professor. In addition to the problems related to the design of aircraft and other types of aircraft, he also deals with the design of ventilation systems in road traffic tunnels, for which he also has the appropriate license of the responsible designer. Until now, he designed ventilation systems in over 30 tunnels for both regular traffic modes and in cases of incidental traffic modes (tunnel fire cases). Stevan Maksimović has the titles of full professor and scientific advisor and he has published over 200 scientific and professional papers in his field of work - the development and application of methods and software for structural strength calculations, as well as for analyzes of strength from the aspect of fatigue and fracture mechanics, and he wrote two monographs. He developed with his associates the software package "LOM-3", which evaluates the age of elements of structures subjected to cyclic loads of both constant amplitude and general load spectrum. This software package is continuously developed and upgraded in the period from 1991. to 2013. It provides an analysis of the strength of aircraft structures, both for the initial damage and for the analysis of the strength of aircraft structures in terms of allowable damages ("damage tolerance approach"), which represents a new approach to the design of combat and civil aircraft. At the Military Academy in Belgrade he was elected as a full professor where he taught foreign and domestic students at specialist and doctoral studies. He had "Lectures on Call" several times at international meetings as well as events of national importance. He is a member of the Serbian Society of Mechanics of Serbia and in the period from 2009. to 2013. he was president of Serbian Society of Mechanics in two terms.

12. **Lecturer**: Jelena M. Đoković
Afilation: Technical faculty in Bor University of Belgrade
Data: 12.02.2019.
Lecture: **Analysis of dynamically growing crack behavior approaching an interface based on the energy release rate criterion**
Link:
http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.feb2019.php

A problem of a dynamically growing crack, which is approaching an interface between the two elastic isotropic materials at an arbitrary angle, is considered. That crack could behave in three ways: (i) it can disappear (i.e., it can arrest in contact with the interface), (ii) it can deflect into the interface

and continue to propagate along it or (iii) the crack can penetrate the interface and continue to propagate in the material across it. The competition between the two cases can be estimated by considering the ratio of the energy release rates necessary for the crack penetrating the interface and for the crack deflecting into the interface. A concept that the criterion for the dynamic crack growth in homogeneous solids could be based on the static stress field, with addition of the stress intensity factor dependent on time, is used to explain the behaviour of the crack attacking the interface in dynamic loading conditions. Obtained results provide the possibility for comparison of the dynamic fracture toughnesses of the interface and of the material without the interface, in order to determine whether the incoming crack would deflect into or would penetrate the interface. If the ratio between the dynamic fracture toughness of the interface and the dynamic fracture toughness of the material into which the crack continues to propagate, were less than the ratio of the dynamic release rates for the deflecting and penetrating crack, the incoming crack would deflect into the interface. If the case were reversed, the crack would cross the interface and continue to propagate in the material across it. Comparison of results for the load phase angle dependence on the crack tip propagation speed and on the approaching angle, obtained by this criterion and results obtained by the maximum stress direction criterion proves the validity of the energy release rate concept adopted in this analysis.

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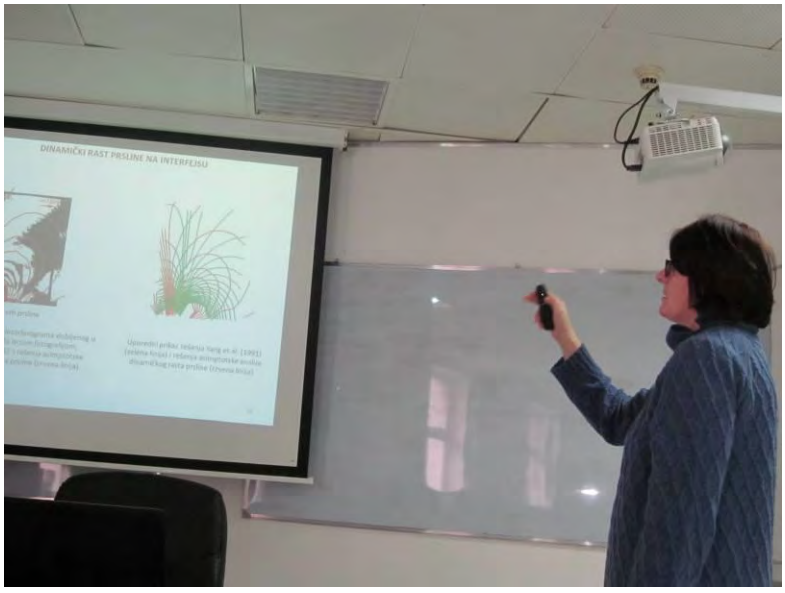


CV

Name: **Jelena Djoković, nee Veljković**

Date of birth: December, 27. 1970.

EDUCATION:

- 2001 – PhD degree in Technical Sciences obtained at Faculty of Mechanical Engineering in Kragujevac, University of Kragujevac, Serbia (21. 12. 2001.). Dissertation title: "Solving crack propagation problem at the interface between the two materials"
- 1998 – MS degree in Technical Sciences obtained at Faculty of Mechanical Engineering in Kragujevac, University of Kragujevac, Serbia (01. 06. 1998.). Master Thesis title: "Analysis of crack propagation at the bimaterial interface".
- 1994 – BS degree in Mechanical Engineering obtained at Faculty of Mechanical Engineering in Kragujevac, University of Kragujevac, Serbia (30. 03. 1994.). Bachelor's Thesis title: "Plastic analysis of structures"

WORK EXPERIENCE:

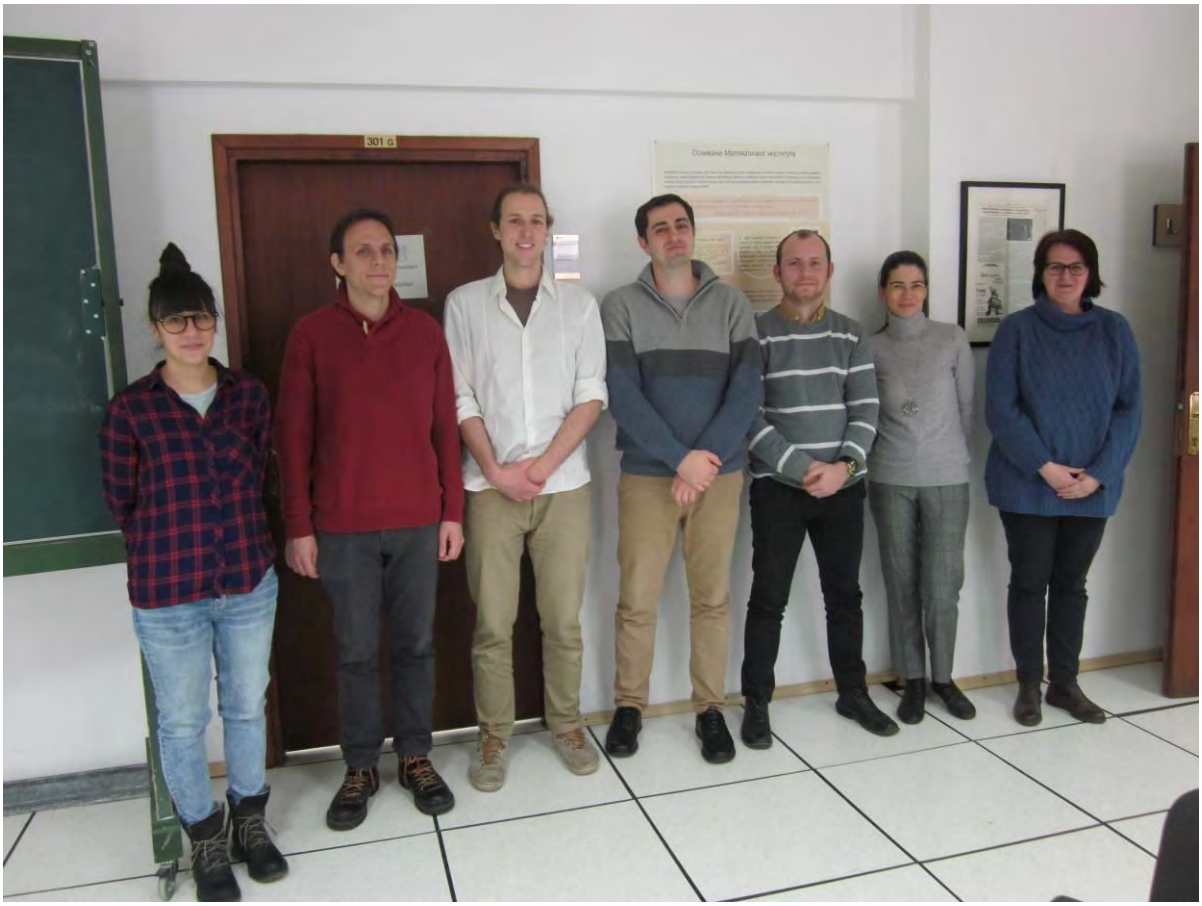
- 2016 – present – Full professor at Technical Faculty in Bor, University of Belgrade
  Teaching courses: Thermodynamics, Strength of Materials and Equipment in the Chemical Industry
- 2011 – 2016 – Associate professor at Technical Faculty in Bor, University of Belgrade
  Teaching courses: Thermodynamics, Strength of Materials and Equipment in the Chemical Industry
- 2006 – 2011 – Assistant professor at Technical Faculty in Bor, University of Belgrade
  Teaching courses: Dynamic of Rotational systems, Power of Machines and Thermodynamics
- 1994 – 2008 Senior designer in RAPP Zastava factory, Kragujevac, Serbia
  Worked with a team of designers and modeled various types of products: transportation system for mine, winches, worm cranes, gearboxes, double - chain conveyors for mine company; installation for edge deflection of roller's tube; machine for circular plates final machining; a machine for producing L ring; a sugar grinder; a machine for packing cartons' boxes; machine for heating and mixing chocolate paste - homogenization machine for food factory; deep hole drilling machine, planetary gearbox, etc.

SKILLS:

- **Computer:** Autodesk Inventor, MS Office
- **Languages**: English – good, Russian - good, German - basic level.

AWARDS:

- 2007- The First place at "The Petar Damjanovic competition" for The best project in area of preparing technical documentations of machines, devices and metal constructions using Autodesk Inventor software.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13. **Lecturer**: Slobodanka Boljanović

Afilation: Mathematical Institute SANU

Data: 26.02.2019.

Lecture: **Failure analysis of structural components under cyclic loading**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.feb2019.php

Fatigue is perhaps the most common cause of crack initiation and growth which ultimately results in the fracture of a structure or components. For prevention of such failures, it is very important to establish efficient methods that enable determination of fatigue strength. In view of complexity of fatigue as process, the strength analysis has to be considered through the following phases: crack initiation, crack propagation and failure. This presentation examines the fatigue performance of damaged structural components through fracture mechanics based computational models. Potential sources of crack-like damages are geometric discontinuities. Such stress concentrators represent positions where an extremely high magnitude of stresses could appear. Thus, the nonlinear behaviour of cracks is analyzed employing analytical models which are linked with relevant fracture mechanics concepts. Also, numerical approaches based on the finite element method are used to evaluate stress state field under cyclic loading. In the residual strength evaluations the stress-ratio dependence failure models are implemented.

The computational models proposed are verified by employing available experimental data and comparisons between different crack growth results show a good correlation. Additionally, for safety-critical component such as pin-lug connection the effects of width, diameter of hole and thickness are discussed.

Acknowledgment: The research work presented was financially supported by the Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade and the Ministry of Science and Technological Development of Serbia through the Project No. OI 174001.

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CV

Slobodanka S. Boljanović (Research Associate Professor, Mathematical Institute of SASA, Belgrade, Serbia) was born in Belgrade and after graduation from the First Belgrade Gymnasium enrolled the Faculty of Mechanical Engineering at the University of Belgrade. She obtained the B. Sc. degree in 1991 at the Department of Aeronautical Engineering. Simultaneously, she studied at the Faculty of Mathematics, University of Belgrade, and in 1994 graduated with the B.Sc. degree at the Department of Mechanics.

Immediately after graduation from the Faculty of Mechanical/Aeronautical Engineering Slobodanka Boljanović enrolled the postgraduate studies at the Department of Aeronautical Engineering in Belgrade where she obtained Master's degree in 1997, and under the supervision of Prof. dr Zlatko Petrović, obtained Ph. D. degree in 2006. Furthermore, her second doctoral dissertation was presented at the Faculty of Mathematics, University of Belgrade under the supervision of Prof. dr Boško Jovanović, and in 2012 she obtained Ph. D. degree at the Department of Numerical mathematics and optimization.

From 1994 she has been intensively involved in scientific research at the Military Technical Institute Belgrade – the Department of Strength. Since October 2014 she has been engaged as an associate contributor of Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade. Staring from March 2015 she has been employed at the Mathematical Institute of SASA, first as a Research Assistant Professor and from November 2016 as a Research Associate Professor under Project No. OI 174001 where she develops mathematical models of real physical problems.

Through the scientific research activities she dealt with theoretical and numerical modeling of engineering systems and materials, as well as fracture mechanics of engineering systems under time-variable loading conditions, applicable in design phase and/or during exploitation (i.e. periodical maintenance inspections) of structures. Scientific aspects of realized theoretical investigations, so far, include: the stress analysis, the modeling of material behavior, the fatigue analysis, fracture mechanics, the development of reliable software programs for the simulation of residual life related to crack initiation phase, and the strength evaluations for structural components with damages.

The scientific results achieved through the theoretical investigation of relevant fracture mechanics problems she published as the first author in more then 50 scientific articles/papers in academic journals indexed in reference databases and in proceedings of the international scientific conferences, as well as in two doctorial dissertations completed at the Faculty of Mathematics and the Faculty of Mechanical Engineering at the University of Belgrade.

At the invitation of Editors she is engaged as a reviewer in top-leading international journals (*International Journal of Fatigue, published by Elsevier*; *Smart Materials and Structures, published by IOPscience* and *Journal of Engineering Mechanics, published by ASCE*), as well as in leading national journal (*Scientific Technical Review, published by the Military Technical Institute, Belgrade*). Also, she is member of ESIS (European Structural Integrity Society). Furthermore, as a member of scientific committees, she actively participated in the organization of the International Congresses of Serbian Society of Mechanics

14. **Lecturer**: Ivana Atanasovska
Afilation: Mathematical Institute SANU
Data: 05.03.2019.
Lecture: **On biomimetics in machine elements design**
Link:
http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.mar2019.php

Presentation of the lecture prepared for conference ICAMEN2019

The idea of imitating Nature has been developed 3000 years ago, when the Chinese attempted to make artificial silk and roughly at the same time another imitation of Nature that most likely resulted from humans observing the spider using its web to catch flies occurred – fishing nets. But, it can be said that man has always drawn on Nature for inspiration. Leonardo Da Vinci designed ships based on the shapes of fish and planes based on the wings of birds. The discussion and the results of the application of biomimetics principles in machine elements design are given. The basic definitions and history of the developing of this discipline are presented. The biomimetics is one of the inter-disciplinary disciplines which reach their full attention during last decade. The engineers are realizing the benefits which can be gained by the biomimetics principles according with the new requirements in machine design such as: size reduction, energy efficiency increasing and higher reliability. Therefore, biomimetics has intents to grow up in a new and progressive discipline widely use in machine elements design. In this lecture, the focus is on the geometric optimizations in machine elements design based on the nature design as inspiration. As the example of the machine elements design based on the biomimetics principles, the new design for the transition zone of the particular high loaded shaft is developed and analyzed. The new design is inspired with the design solutions which Nature made in the case of trees. The comparative Finite Element Analysis is performed for both transition zone designs: the traditional engineering design and the design based on the biomimetics. The conclusions about the increased load capacity obtained with innovative biomimetics design are discussed.

15. **Lecturer**: Stepa Paunović

Afilation: Mathematical Institute SANU

Data: 19.03.2019.

Afilation: **A brief overview of photoelasticity and its applications to some dynamic problems**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.mar2019.php

Photoelasticity is a powerful method for experimental investigation of structures, and it is one of the few methods that provide a direct insight into the stress state in a tested model. Through the use of polariscope, the map of isoclinics and isochromatics can be obtained, after which the information about the values and trajectories of principal stresses can be derived. The photoelastic method has been used in both static and dynamic testing of structures for decades, over which period the method was continuously improved by incorporating new discoveries in materials and technology. These advancements made it possible to perform a photoelastic analysis of some highly complex problems, including stress wave propagation in solids, transient vibrations and contact analysis, plasticization and residual stress investigation, crack initiation and propagation, effects of material discontinuities and inclusions, etc., thus enabling the application of the photoelastic method to a very broad range of mechanical problems. Here, the basic concepts and underlying principles of the photoelastic method are presented, followed by a brief overview of the development and advancement of photoelastic testing, from its beginnings around the middle of the last century, to its current state, while afterwards the examples of the photoelastic treatment of some complex problems are given. In conclusion, the outlooks for possible future applications of the photoelastic method are proposed, emphasising its advantages and comparing it with other methods for analysis of structures.

KEYWORDS

photoelasticity; photoelastic method; dynamic testing; photoelastodynamics;

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CV

STEPA M. PAUNOVIĆ (was born on 28.09.1989, in Niš, Serbia)
Junior research assistant, Mathematical Institute SASA, Belgrade, Serbia
Stepa Paunović is a member of the research team on the project OI 174001 "Dynamics of hybrid systems of complex structures. Mechanics of materials" led by Prof. Dr Katica (Stevanović) Hedrih and coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts. He has been engaged in this research since 2018, and he is also a member of the Serbian Society for Mechanics since 2018.
Currently he is in the final year of his PhD studies at the Faculty of Civil Engineering and Architecture in Niš, Serbia.
Stepa Paunović completed his graduate studies in civil engineering at the Faculty of Civil Engineering and Architecture, University of Niš, in 2012 and received his Bachelor of Science (BSc) degree with honors. He completed his postgraduate studies in the same field and at the same faculty in 2013, thereby receiving his Master of Engineering Sciences (M.Eng.Sci.) degree. In his master thesis he proposed an improvement of the clause 73 of the Code for the design of civil structures in seismically active regions, currently valid in Serbia. He enrolled the doctoral studies at the same faculty in December 2013, passed all the exams and currently is on the final year of studies.
From October 2013 to May 2018 he received the scholarship of the Ministry of Education, Science and Technological Development for the best PhD students in the country, and he was engaged in lectures at the Faculty of Civil Engineering and Architecture, University of Niš, in the department for Engineering mechanics and theory of structures, as a demonstrator. There he participated in practical teaching in the subjects of Engineering Mechanics, Statics, Kinematics, Dynamics, and Strength of Materials. During this period he was also a researcher on the project TR36028 "Development and improvement of methods for analysis of the structure-soil interaction based on theoretical and experimental investigation" led by Prof. Dr Verka Prolović and coordinated by the Ministry of Education, Science and Technological Development.
Since May 2018 he has been employed at the Mathematical Institute SASA as a junior research assistant, and he has been engaged as a researcher on the project "Dynamics of hybrid systems of complex structures. Mechanics of materials" led by Prof. Dr Katica (Stevanović) Hedrih and coordinated by the Mathematical Institute SASA.
Stepa Paunović has published 11 co-authored papers, 3 of which are published in international journals, and has attended several international scientific and professional conferences in his country and abroad.
His main scientific interests lay in the fields of dynamics, continuum and fracture mechanics, and mathematical modeling and computational analysis of structures, including the contemporary numerical methods and their application to civil engineering structures analysis and improvement.
http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php

16. **Lecturer**: Slaviša Šalinić

Afilation: Faculty for Mechanical and civil Engineering in Kraljevo University of Krahujevac

Data: 09.04.2019.

Lecture: **On the modelling of flexible Euler-Bernoulli, Rayleigh and Timoshenko beams by a new lumped-parameter discretization technique**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.apr2019.php

A new lumped parameter method for buckling and bending vibration analysis of a flexible beam subject to an axial compressive load with attached springs and lumped masses at the beam ends is presented. The method represents modification of the classical Hencky bar-chain model. Three types of beams are considered: Euler-Bernoulli, Rayleigh, and Timoshenko beams. The method proposed consists in replacing the elastic beam by a system consisting of massless rigid beams carrying lumped masses. The massless beams are connected through frictionless two-degrees of freedom joints with appropriate lateral and rotational springs in them. The method can be easy adapted to study buckling and bending vibration of flexible beams with various kinds of boundary conditions. Since the inertial characteristic of the flexible beam are represented by lumped masses, the lumped parameter method presented allows a relatively simple program implementation in some of the programming environments such as Mathematica, Matlab, Maple, etc.

KEYWORDS

Lumped masses, Hencky bar-chain model, Multibody, Vibrations

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CV

SLAVIŠA M. ŠALINIĆ (was born on 11 August 1973 in Kraljevo, Serbia) Associate Professor, Faculty of Mechanical and Civil Engineering in Kraljevo, University of Kragujevac, Serbia.

Slaviša Šalinić is an Associate Professor and the Vice Dean of Quality and Infrastructure (2018 -) at Faculty of Mechanical and Civil Engineering in Kraljevo, University of Kragujevac, where he hold lectures at both bachelor academic and doctoral studies in subjects: Mechanics 1, 2, and 3, Engineering Mechanics 2, Oscillations of mechanical systems, Machine Dynamics, Mechanics of Rigid Multibody Systems, Stability of Motion of Mechanical Systems, and Selected Chapters in Mechanics. He also takes a part as a researcher in the research project, which is coordinated by Faculty of Mechanical Engineering, University of Belgrade from 2011, Project leader: Prof. Srđan Bošnjak. He is a member of the Serbian Society of Mechanics.

He graduated from the Faculty of Mechanical Engineering in Kraljevo, University of Kragujevac, in 1997. He received the M.Sc. degree in 2003 after the defense of the thesis “Dynamics of rigid multibody systems with non-ideal constraints with application to technical objects” at the Faculty of Mechanical Engineering, University of Belgrade. Further, he defended his PhD degree in 2009 at the Faculty of Mechanical Engineering in Kraljevo, University of Kragujevac. The title of his Ph.D. dissertation was: ”Brachistochronic motion of mechanical systems with non-ideal constraints and applications to technical objects”.

Professor Slaviša Šalinić started working at the Chair of Mechanics, Faculty of Mechanical Engineering in Kraljevo, University of Kragujevac, in 1997, and was elected to the title of the associate professor for narrow scientific field of Mechanics in 2014 at Faculty of Mechanical and Civil Engineering in Kraljevo. Professor Slaviša Šalinić is a mentor for one doctoral dissertation and he was a member of several commissions for evaluation of the dissertations. Also, as author or co-author, professor Slaviša Šalinić published more than 30 SCI-journal papers. His research interest include applied mechanics, mechanical vibrations, kinematics and dynamics of multibody systems, mechanism and machine theory. She is the reviewer in leading international journals in the area of mechanics and mechanical engineering: Mechanism and Machine Theory published by Elsevier, International Journal of Mechanical Sciences published by Elsevier, Theoretical and Applied Mechanics published by Serbian Society of Mechanics and Mathematical Institute of the Serbian Academy of Sciences and Arts, Belgrade.

17. **Lecturer**: Marija Mikić

Afilation: Faculty of Mathematics University of BelgradeМатематички факултет, Универзитет у Београду

Data: 16.04.2019.

Lecture: **Asymptotic properties of solutions of Emden-Fowler equations and their generalizations**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.apr2019.php

Emden-Fowler differential equation came first into prominence in connection with the astrophysical researcher Emden. A number of results obtained by Emden in the usual half-intuitive, wholly ingenious fashion of the physicist were made by Fowler, who was then stimulated to continue and give a complete discussion of solutions of this equation for all values of the parameters. The equation has several very interesting physical applications, occurring in astrophysics in the form of the Emden equation and in atomic physics in the form of Fermi-Thomas equation.

Mathematically, the equation has great potential. It is a nonlinear differential equation with a large class of solutions whose behavior can be ascertained with astonishing accuracy, despite the fact that the solutions, in general, can't be obtained explicitly. The Emden-Fowler type of equation has significant applications in many fields of scientific and technical world and this equation has been investigated by many researchers.

The subject of this lecture is the investigation of asymptotic properties of solutions for differential equations of Emden-Fowler type and their generalizations. The conditions, which provide that this equation has infinitely many solutions defined in some neighborhood of zero, were described here, both with the conditions, which guarantee the existence of infinitely many solutions with certain asymptotic behavior. Also, a complete picture of the asymptotic behavior of solutions of the equation along the positive parts of both axes is given. The conditions, which assure existence and unique solvability of a solution of the Cauchy problem for this equation, were shown in the cases when the familiar theory can't be applied.

KEYWORDS

Emden-Fowler differential equation, asymptotic behavior of solutions, Cauchy problem

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CV

MARIJA D. MIKIĆ, (born on 12 May 1987 in Smederevska Palanka, Serbia)
Assistant Professor, University of Belgrade, Faculty of Mathematics, Serbia

Marija Mikić takes a part as a researcher in the Research Project 174001, which is coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA) from 2011 with project leader: Prof. Katica (Stevanović) Hedrih. From 2016 onwards, she is coordinator of Research Project 174001 for Faculty of Mathematics.

Marija studied at the Faculty of Mathematics in Belgrade and graduated in 2010. She finished the Master studies in 2011 at the same Faculty. Marija finished her PhD studies in 2018 at the Faculty of Mathematics, University of Belgrade, under the supervision of Prof. Đorđe Krtinić. The title of her PhD thesis is "Asymptotic properties of solutions of Emden-Fowler equations and their generalizations".

From 2010 to 2012, she worked as Teaching Associate at the Department of Differential Equations at the Faculty of Mathematics, University of Belgrade. From 2012 to 2018, she worked as Assistant at the Department of Differential Equations at the Faculty of Mathematics, University of Belgrade and from October 2015 to January 2016 as Assistant at the Department of Mathematical Sciences at Faculty of Technology and Metallurgy, University of Belgrade. From December 2018 onwards, Marija works as Assistant Professor at the Department of Differential Equations at the Faculty of Mathematics, University of Belgrade.

From 2013 onwards, Marija is a lecturer at the preparatory classes in mathematics for entrance exam for faculty, which organize Faculty of Mathematics, and from 2016 onwards, she is a coordinator for these classes. She is a member of the council of Faculty of Mathematics and a member of the Serbian Society of Mathematics.

Marija Mikić published 8 papers as author or co-author, among them: 5 papers in international journals (SCI). She attended a few national and international scientific conferences.

18. **Lecturer**: Snežana Ćirić-Kostić

Afilation: Faculty for Mechanical and civil Engineering in Kraljevo University of Krahujevac

Data: 23.04.2019.

Levture: **Advanced design rules for optimal dynamic properties of additive manufacturing products**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.apr2019.php

Additive manufacturing (AM) technologies are based on the principle of production by addition of subsequent layers of material (therefore the nickname “layer-by-layer” manufacturing for AM) without use of tools for shaping or removing of material. This production principle enables production without majority of design constraints imposed by conventional production technologies, making AM technologies suitable for the production of parts with complex geometry (lattice and cellular design, bionic design, multi functionality integrated by shape, etc.) and opening new possibilities for innovation in design. Having in mind the consequential differences in microstructure, it is necessary to study the static and dynamic behaviour of parts manufactured by AM in accordance with the relevant standards before the parts may be used under the similar exploitation conditions as the parts produced by traditional technologies. While the static characteristics of AM parts have been largely studied during the first decade of the 21st century, dynamic behaviour studies began only in this decade, still with scarce and not systematized results.

The goal of the lecture is to present the results of studies of dynamic behaviour of steel parts produced by direct metal laser sintering (DMLS) performed within the framework of the H2020 project A_MADAM. The lecture consists of presentation of the research plan of the project, followed by overview and discussion of the results of testing the influence of the technology parameters on the fatigue behaviour of maraging steel and stainless steel parts produced by DMLS. The objective of the project is to understand the dependencies between the characteristics of the production process and the observed fatigue behaviour of the tested samples, thus opening the possibilities for optimizations from two aspects: 1) optimization of the product

design with respect to the production process and 2) optimization of the production process in relation to product design.

KEYWORDS

Additive manufacturing, DMLS, dynamic properties, fatigue strength, design for AM

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CV

Snezana M. Ćirić Kostić (born on 10 February 1967 in Kraljevo, Serbia)
Assistant Professor, Faculty of Mechanical and Civil Engineering in Kraljevo, University of Kragujevac, Serbia
Snežana Ćirić-Kostić is the Head of the Laboratory “3D Impuls” of Faculty of Mechanical and Civil Engineering at Kraljevo /University of Kragujevac/ since its establishment in 2012. Her responsibilities include organization of research work in the Laboratory, provision of services of the Laboratory to market, as well as promotion of research results of the Laboratory.
Besides the position, dr Ćirić-Kostić is a teacher for subjects on mechanical design at graduate and postgraduate studies of the Faculty (“Mechanical Design” at bachelor studies, “Machine Design” and “Digital Technologies for Product Development” at master studies and “Noise and Vibrations of Mechanical Systems” at PhD studies).
She graduated at Faculty of Mechanical Engineering of University of Belgrade in 1990, and worked as teaching assistant for mechanical design and machine design at Faculty of Mechanical Engineering in Kraljevo 1991-2010. After defending PhD thesis in 2010, she was promoted to position of Assistant Professor at University of Kragujevac. In period from 1991 to 2019 she participated in 9 research project funded by Ministry of Science of Republic of Serbia. Since 2005, she is participating in international research and education projects (TEMPUS, FP7, CEPUS, RSEDP2, ERASMUS+, Horizon2020) in which she had positions of researcher, workpackage leader, member of project boards, member of EU regional expert groups for additive manufacturing and project manager of two EU projects. In periods 2009-2011 and 2018-2019, she has been at several occasions seconded to University of Bologna, where she was engaged as both teacher and researcher. Based on the results of the project “Impuls” and with support of USAID sustainable local development project, she established the laboratory for additive manufacturing and reverse engineering – known as the Laboratory “3D Impuls” – in 2012, with the aim to facilitate innovativeness of Serbian SMEs. At the moment, she manages the project A_MADAM (Advanced design rules for optimMAl Dynamic properties of Additive Manufacturing products), financed by EU H2020 program.
Dr Snežana Ćirić Kostić is author of 27 papers in academic journals and 57 articles presented at scientific conferences.
Last updated: January 01, 2019

19. **Lecturer**: Jochen mau

Afilationn: Faculty of Medicine, Heinrich Heine University, Düsseldorf, Germany

Dara: 07.05.2019.

Lecture: A holistic axiomatic approach to human-body system dynamics

Limk:

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A hierarchically nested structure of functional compartments with effectuation dynamics emerging by successive translation from embedded functional units, themselves functional compartments composed from functional units is postulated. It spans from 1014 human-body cells to person's whole body in a bottom- up perspective, or from whole body to lower level functional components in drill-down. The latter per - spective leads to axiomatic "wirk-gefuege", a structure of effectuation and its dynamics, decomposable into three "wirk-components" for concerted effectuation of vital functions, production functions, and operational functions, that are canonical in production systems. The human-machine system of an excavator with human operator, the "greifbagger" model concept of whole human-body system, the Whole, is the motivating illustration. It is the advantage of an axiomatic approach to strip off all "companion information" and otherwise knowledge about the Whole when focusing on the interaction between those three level-one canonical functional components that expresses in and completely determines behavioral action of Whole. Generic in-component dynamics are postulated as simple first-order kinetics of "charge" transfers in a direct- current twin-circuit type of construct to comply with living nature's design principle of wake-sleep cycles.

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CV

Univ.-Prof. Dr. rer. nat. habil. Jochen MAU

Name 姓名: MAU Jochen 中文名字：毛有成 Йохен МАУ

Academic titles 学位: Universitätsprofessor 科大学教授 профессор университета

Dr. rer. nat. habil. (Medizinische Biometrie) 理论医科学授课资格 д-р теорет. мед. наук

Dr. rer. nat. (Mathematik) 数学科学博士 канд. математ. наук

Diplom-Mathematiker 数学科学硕士 диплом математ. наук

Last office position: Universitätsprofessor (Lehrstuhlinhaber) 大学正教授（职位）ординарный профессор
(заведующий кафедрой)

Current position: Universitätsprofessor im Ruhestand 大学正教授 (暂时退休)
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ун-та им. Г. Гейне г. Дюссельдорф
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Academic Career Steps and Positions

1971: Dipl.-Math. (graduation after 5-yrs scientific education in *Mathematics*), Free University of Berlin
1971 - 1976: Scientist, Institute of Medical Statistics and Documentation, School of Medicine, University of Mainz, Germany
1977: Dr. rer. nat. (Ph.D. in *Mathematics*), University of Mainz, Germany
1977 - 1980: Biometrician, Scientific Computing Centre, CIBA-GEIGY Ltd., Basle, Switzerland
1981 - 1982: Principal Investigator, Dept. Medical Statistics and Documentation, School of Medicine, Rhenanian-Westphalian University of Technology RWTH Aachen, Germany
1982-1988: Researcher, Institute of Medical Biometry, School of Medicine, University of Tübingen, Germany
1984: Habilitation (certified academic teaching qualification, title of Dr.habil.) for *Medical Biometry*, School of Medicine (Theoretical Medicine), University of Tübingen, Germany
1986: Appointed **Extraordinary Professor** for *Medical Biometry* by Federal State of Baden-Württemberg
1988: Appointed **University Professor for Life** by Federal State of North-Rhine-Westphalia
1988-2011: Full professorship (chair) of *Statistics and Biomathematics in Medicine*, School of Medicine, Heinrich Heine University Düsseldorf, and Managing Director of the Institute of Statistics in Medicine, University Hospital Düsseldorf, Germany.
2011: Retired from office and active duty at Heinrich Heine University Düsseldorf
2011-2012: Freelance **Lecturer** in Econometrics and in Statistics, School of Economics, and in Demography and in Mathematics, Statistics and Data Analysis, School of Life Sciences, Rhine-Waal University of Applied Sciences, Kleve, Germany.
2012-: Founder and Owner, Institute of Quantitative Methodology - Private Academic Consultancy for

Research and Development.
2014- : Founder "Initiative Biokybernetik" in German science; since then organization of annual workshops in Germany: 2014-2018
2015- : Associate Editor of Karger Journal "Cerebrovascular Diseases"
2016- : Initiator and Co-Organizer of
- Russian-German Conferences "MultiScale BioMathematics - Coherent Modeling of Human Body System"
2016 (Lomonosov Moscow State University, Russia)
2017 (Krefeld, Germany)
2018 (Lomonosov Moscow State University, Russia)
- International Conference "Molecular Health - From Cell to Population"
2018 (Southern University of Science and Technology, Shenzhen, China)
- Transcontinental Conference "Comprehensive Understanding of Human Health and Impact from Person's Life-Sphere Surroundings in Populations across the Eurasian Landmass
2018 (Krefeld, Germany)

20. **Lecturer**: Sreten B. Stojanović

Afilation: Faculty of Technology in Leskovac University of Niš

Data: 14.05.2019.

Lecture: **Robust finite-time stability of uncertain systems with time-varying delays**

Linl:

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The phenomenon of time-delay is very common in engineering systems, such as chemical systems, biological systems, mechanical systems, and networked control systems. In practice, the most real problems can be modelled by systems with interval time-varying delay, nonlinear perturbations and parameter uncertainties. The time-delay, nonlinearities and parameter uncertainties can cause instability and poor performance of systems. In many practical applications, the concept of Lyapunov asymptotic stability is often insufficient to study the transient performances of a system. A system can be Lyapunov stable but completely useless because it possesses undesirable transient performances. In order to study these problems, the concept of finite-time stability (FTS) was introduced. In this lecture, the FTS concept is extended to the class of continuous and discrete-time systems with interval time-varying delay, nonlinear perturbations and parameter uncertainties, and some delay-dependent sufficient conditions for FTS are proposed in terms of linear matrix inequalities. The new continuous and discrete Lyapunov–Krasovskii functionals with exponential and power functions are used, respectively. In order to obtain less conservative results an integral inequality with exponential function and a summation inequality with power function are proposed. Numerical examples are given to illustrate the effectiveness of the proposed results.

KEYWORDS

Finite-time stability, Time-delay systems, Lyapunov functional, Integral inequity, Summation inequality, Linear matrix inequalities

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CV

SRETEN B STOJANOVIC, (was born on 12 October 1965 in Leskovac, Serbia), Full Professor, University of Nis, Faculty of Technology, Leskovac, Serbia.

Sreten Stojanovic takes a part as a researcher in the research projects which are coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA) from 2006, Project leader: Prof. Katica (Stevanović) Hedrih.

He has also the successful collaborations with "Harvard Medical School", Boston MA, USA, "Faculty of Science", Mahidol University, Bangkok, Thailand, "School of Electrical Engineering" Korea University, Seoul, South Korea, "Polytechnic University of Milan", Milan, Italy.

He received B.E. and M.Sc. degrees from the Faculty of Electrical Engineering, University of Belgrade in 1991 and 1995, respectively. He received Ph. D. from University of Belgrade in field of Control and System Science Engineering in 2006.

From 1991 to 2006, he was an assistant at the University of Nis, Faculty of Technology, Department of mathematical and engineering sciences. He became an assistant professor in 2006, associate professor in 2011 and full professor in 2016 at the same school in field of Electrical and Computer Engineering. He performed the function of the vice-dean at the Faculty of Technology in Leskovac from 2011 to 2018.

He published 2 chapters in international monographs, 6 national scientific monographs, 18 papers in a leading international journals with SCIE list, 41 papers in other international journals, 55 papers published in proceedings and presented at the international conferences, 28 papers published in proceedings and presented at the national conferences, 1 textbooks and 1 handbooks published by the Faculty of Technology.

Sreten Stojanovic is a member of editorial board of a scientific journal. He participated in the work of organizing committees of several conferences with international significance. He served as the reviewer of respectable journals (over 70 papers) and conferences (over 30 papers).

As a researcher, he participated in the realization of six research projects and one project in the field of development of higher education financed by the Ministry of Science and Technological Development. In addition, he participated in the realization of an international IPA project.

His research interest covers control system theory, time-delay systems, neural networks.

http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php

http://www.mi.sanu.ac.rs/novi_sajt/research/seminars/mechanics_machines_mechanisms.php

21. **Lecturer**: Marina Ćetković

Afilation: Faculty of Civil Rngineering University of Belgrade

Data: 21.05.2019.

Lecture: *Nonlinear analysis of composite plates using layerwise finite element*

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.may2019.php

The geometrically nonlinear continuum plate finite element model, hitherto not reported in the literature, is developed using the total Lagrange formulation. With the layerwise displacement field of Reddy, nonlinear Green-Lagrange small strain large displacements relations (in the von Karman sense) and linear elastic orthotropic material properties for each lamina, the 3D elasticity equations are reduced to 2D problem and the nonlinear equilibrium integral form is obtained. By performing the linearization on nonlinear integral form and then the discretization on linearized integral form, tangent stiffness matrix is obtained with less manipulation and in more consistent form, compared to the one obtained using laminated element approach. Symmetric tangent stiffness matrixes, together with internal force vector are then utilized in Newton Raphson's method for the numerical solution of nonlinear incremental finite element equilibrium equations. Despite of its complex layer dependent numerical nature, the present model has no shear locking problems, compared to ESL (Equivalent Single Layer) models, or aspect ratio problems, as the 3D finite element may have when analyzing thin plate behavior. The originally coded MATLAB computer program for the finite element solution is used to verify the accuracy of the numerical model, by calculating nonlinear response of plates with different mechanical properties, which are isotropic, orthotropic and anisotropic (cross ply and angle ply), different plate thickness, different boundary conditions and different load direction (unloading/loading). The obtained results are compared with available results from the literature and the linear solutions from the author's previous papers.

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CV

Marina Ćetković is Associate Professor at the Faculty of Civil Engineering, University of Belgrade, Serbia. Marina Ćetković was born in Belgrade in 1974, where she finished Elementary School and Gymnasium with excellent grade. She was admitted the Faculty of Civil Engineering at the University of Belgrade in 1993/1994 and received Diploma of Civil engineering Degree in the school year 1999/2000 at the Structural Engineering Module, with average grade of 8.98. She defended Diploma thesis with the title "Elasto-Plastic Timoshenko Beam Analysis" at the Department of Structural Mechanics. In the school year

2004/2005 she defended the Master thesis with the title “Application of Finite Element Method on Generalized Laminated Plate Theory” and in the school year 20010/2011 she defended Ph.D. thesis with the title “Nonlinear Behavior of Laminated Composite Plates” at the Faculty of Civil Engineering in Belgrade, Serbia.

Marina Ćetković received the Prize by the Belgrade Chamber of Economy for the best Diploma thesis defended at the Faculty of Civil Engineering in Belgrade, in 1999/2000. In 2002 she got the second prize for the presentation of Diploma thesis "Elasto-plastic Steel Beam Analysis" at the Workshop for Young Engineers in Herceg Novi, Montenegro, organized by DAAD. In the school year 2004/05 she received the Prize for the best Master thesis defended at the Faculty of Civil Engineering of Belgrade.

At the Department for Structural Mechanics, Faculty of Civil Engineering in Belgrade, Serbia, Marina Ćetković was appointed for the Probationer Assistant in year 2000, for the Teaching Assistant in year 2005, for the Assistant Professor in in year 2012 and for the Associate Professor in year 2016. She gave the contribution in the preparation and carrying out the practice and exams in teaching courses: Statics of Structures, Structural Mechanics, Stability and Dynamics of Structures, Dynamics of Structures and Earthquake Engineering and Technical Mechanics. Also she participated in the postgraduate courses: Application of Finite Element Method in Civil Engineering and Theory of Composite Plates. Nowdays she is the Associate Professor at the courses: Structural Mechanics and Elasto-plastic Analysis of Frame Structures.

Marina Ćetković is author of thirty six papers published in international and national journals, monographs, and reports from international and national conferences. She has more than sixty citations of published papers. Marina Ćetković is reviewer in international journals in the field of structural mechanics. She is coauthor of two books, the first and extended edition of the book Practicum of Statics of Structures. At the Faculty of Civil Engineering of the University of Belgrade she was a member of commission for the defense of diploma thesis and the member of the commission for the admission to Master studies. Until now, she has participated in three projects of the Serbian Ministry of Science and Technology, and is still on one of them.

Marina Ćetković is a member of the Serbian Society for Mechanics and Society for Structural Integrity and Life of Structures. She speaks and writes in English and has obtained the Middle Level Proficincy of German lenguage.

22. **Lecturer**: Jasmina Bogdanović-Jovanović

Afilation: Facukty of Mechanical Engineering University of Niš

Data: 28.05.2019.

Број присутних: 8

Lecture: **Determination of averaged axisymmetric flow in hydraulic turbomachines and low pressure fans**

Link:

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.may2019.php

Due to geometrical complexity of hydraulic turbomachines and low pressure fans and complex nature of turbulent flow, the designing process requires the introduction of certain simplifications, the numerous empirical data in calculations and, finally, the model and prototype testing. Nowadays, fluid flow in turbomachinery can be numerically simulated using CFD methods and obtain flow parameters in the entire flow domain. This enables calculating the averaged flow parameters according to the circular coordinates, in numerous discrete points of the flow domain, using the methodology presented in the paper. The averaged axisymmetric flow surfaces and meridian streamlines can be obtained as well. For the turbomachinery designer it is of the greatest importance to be able to compare such obtained surfaces to axisymmetric flow surfaces which are used in blades profiling and determine how much they overlap. In this way a designer can make possible corrections of the impeller during the designing process, potentially saving the time and cost of prototype making and testing.

REFERENCES

[1] Babić, M., Stojković S., (1990), Basics of Turbomachinery: operating principles and mathematical modeling, University of Kragujevac, Naučna knjiga, Belgrade.

[2] Bogdanović-Jovanović J., (2014), Determination of Averaged Axisymmetric flow in hydraulic turbomachinery runner, PhD Thesis, University of Niš, Faculty of Mechanical Engineering, Serbia.

[3] J. Bogdanović-Jovanović, B. Bogdanović, D. Milenković, (2012), Determination of averaged axisymmetrical flow surfaces according to results obtained by numerical simulation of flow in turbomachinery, Thermal Science, vol.16, Sup. 2, p.647-662.

[4] J. Bogdanović-Jovanović, D. Milenković, Ž. Stamenković, Ž.Spasić, (2017), Determination of averaged axisymmetric flow surfaces and meridian streamlines in centrifugal pump using numerical simulation results, Facta Universitatis Mechanical Engineering, vol.15, no3, p.479-493.

CV

Date of birth: 23rd July1975. in Nis, Serbia. Married and mother of one daughter.

1994 – 2000: Graduate Mechanical Engineer (Dipl.Ing) - 10 semester study program on the Department of Hydroenergetics, Faculty of Mechanical Engineering University of Nis, Serbia, with an average grade 9,76.

- Award and scholarship from the Norway Government.
- Laureate of the best graduate student award of Faculty of Mechanical Engineering in Nis, as well as the award of University of Nis (for the school year 1999/2000).

2000 – 2015: Right after the graduation start working in Faculty of Mechanical Engineering University of Nis as a Teaching Assistant.

In 2000 started postgraduate study on Applied Fluid Mechanics at the Department of Hydroenergetics, Faculty of Mechanical Engineering University of Nis.

- Participant of PhD course ''SimLab Short Course on Numerical Simulation and Parallel Computing - Belgrade 2006'', 1.-7. October 2006. (lecturers: Hans-Joachim Bungarz).
- Participant of TEMPUS workshop organized by Faculty of Mechanical Engineering Kragujevac (Restructuring of Mechanical Engineering studies, CD_JEP-18114-2003), Computational Fluid Dynamics, OpenFOAM i ParaViewlecturers: prof. Dr Müler and Adrian Magda from the Techical University Braunschweig), 29.may - 2. june 2006.
- Participant of PhD course ''The Second Ph.D Course - Computational Engineering'', under the patronage of DAAD, Pamporovo, Bulgaria, 10. - 15. june 2006.

Since 2008. PhD studies in Faculty of Mechanical Engineering University of Nis
During 2013 absent due to maternity leave.
Author and coauthor of many scientific and professional paper works.
Co-author of 3 text books in Serbian language, published by Faculty of Mechanical Engineering, University of Niš.
1.FANS – OPERATING PARAMETERS AND EXPLOATATION PROPERTIES (2006).
2.COMPRESSORS – TERMODINAMICS OF GAS COMRESSION (2007).
3. PNEUMATIC CONVEYING (2009).
Currently in the process of publishing the textbook: PIPELINE TRANSPORT - theoretical basics with examples,
Co-author of many technical solutions.
Researcher of 5 projects supported by the Ministry of Science, Technology and Development, Republic of Serbia.
Several industry projects and expertize.
Teaching courses on modul Energetics and Process Technics: Communal Hydrotehnics and irrigation, Hydraulic and Pneumatic Transport, Kompressors and Fans, Energy Efficiency and Ecology.
Teaching course on modul Traffic Engineering, Transport and Logistics: Pipeline Transport.
Teaching course on Engineering Management: Management in Ecology.

2014 PhD thesis on Applied Mechanics of fluid at the department of Hydroenergetics, Faculty of Mechanical Engineering University of Nis.

2015 – present: Assistant Professor (scientific field: theoretical and applied fluid mechanics) at the Department of Hydroenergetics, Faculty of Mechanical Engineering, University of Nis, Serbia.

2017 Award of Faculty of Mechanical Engineering in Niš.

IT skills: *Computer literate in MS Office, Ansys CFX, AFT Fatom, Origin, Corel Draw, etc.*

Language skills: **Serbian, English (speak and write), French (understand and write).**

23. **Lecture**: Radivoje Mitrović

Afilation: Facukty of Mechanical Engineering University of Belgrade

Data: 11.06.2019.

Lecture: Industrija 4.0 – Sadašnjost i budućnost kroz digitalizaciju

Linkl

http://www.mi.sanu.ac.rs/novi_sajt/seminars/programs/seminar21.jun2019.php

Šta je Industrija 4.0, kao filozofija budućeg razvoja privrede i društva uopšte, i da li imamo izbora u pogledu prihvatanja osnovnih postavki ove nove industrijske revolucije, pitanja su na koja ćemo dobiti odgovor na ovom predavanju. Naučićemo da nije dovoljno da samo pratimo tok razvoja i primene tehničko-tehnoloških dotignuća u svim sferama, pre svega ona zasnovana na digitalizaciji, već da moramo biti deo tog toka i ploviti njime pogonjeni svojim sopstvenim naučnim jedrima. Predavač, Prof. Radivoje Mitrović, dekan Mašinskog fakulteta u Beogradu, s obzirom na svoje angažovanje i delovanje poslednjih godina na ovu temu, najpozvaniji je da da odgovore na ova i ostala pitanja vezana za Industriju 4.0 u Srbiji, u sferi obrazovanja, nauke i društvenog i privrednog razvoja. Nesumnjivo je da će nakon ovog predavanja mnoga pitanja ostati otvorena, ali je sigurno da će se nešto promeniti, a to je da ćemo biti za još jedan korak bliže saznanju da ne možemo stajati i nezainteresovano posmatrati razvoj u svetu vezan za digitalizaciju, već moramo postati njegov aktivni i neodvojivi akter.

CV

Prof. dr Radivoje Mitrović, rođen je 11.03.1957. (Lopare, Republika Srpska – BiH). Na Mašinskom fakultetu Univerziteta u Beogradu diplomirao je 1981, magistrirao 1988. i doktorirao 1992. godine.

Tokom studija obavljao je dužnost predsednika Studentske konferencije SSOJ (1978. godine), a u periodu 1979-1980. – dužnost studenta prodekana Mašinskog fakulteta. Profesionalnu karijeru započeo je kao konstruktor-tehnolog u fabrici IKL - Industrija kotrljajnih ležaja, a od 1983. godine stalno je zaposlen na Mašinskom fakultetu. Pored obaveza asistenta-pripravnika, asistenta, docenta, vanrednog i redovnog profesora, obavljao je više rukovodećih dužnosti: član Saveta Fakulteta, šef Katedre za opšte mašinske konstrukcije i dr. Njegovo angažovanje je prepoznato i priznato, pa je 2015. godine izabran za dekana Mašinskog fakulteta.

Sem angažovanja u prosveti i obrazovanju, Radivoje Mitrović obavljao je veliki broj javnih funkcija: zamenik ministra za nauku i tehnologiju (1998-2000), ministra za nauku i tehnologiju Vlade Republike Srbije (2000-2001.), državnog sekretara u Ministarstvu prosvete, nauke i tehnološkog razvoja Vlade Republike Srbije (2008. do 2013.) i dr.

Više puta se stručno usavršavao u inostranstvu, u Saveznom naučnoistraživačkom institutu za kotrljajne ležaje VNIIPP, Moskva, Rusija (1987.) i u Brnu, Češka (od 1990. do 1991.) – kao stipendista Češke vlade i Vlade Republike Srbije.

Kao mentor i član, učestvovao je u više komisija za odbranu magistarskih teza i doktorskih disertacija, na matičnom i drugim fakultetima. Rukovodilac je laboratorije LIMES (Laboratorije za ispitivanje mašinskih elemenata i sistema) – akreditovane od 2008. godine.

Kao saradnik i rukovodilac učestvovao je u realizaciji brojnih naučnoistraživačkih i stručnih projekata iz oblasti proračuna mašinskih elemenata i sistema, ispitivanja kotrljajnih ležaja, tehničkog zakonodavstva, upravljanja inženjerskim projektima, direktiva EU, konstruisanja mašina, pouzdanosti mašinskih elemenata i sistema.

Bio je član Naučno-tehničkog saveta komiteta za standardizaciju OSPP pri SEV (Organizacija proizvođača i potrošača kotrljajnih ležaja) i nacionalne UNESCO komisije.

Član je Asocijacije za Dizajn, Elemente i Konstrukcije – ADEKO (od decembra 2014. godine je predsednik), Društva za Integritet i Vek Konstrukcija – DIVK, Srpskog društva za tribologiju, Srpskog društva za mehaniku itd. Od 2005. do 2008. godine je bio predsednik upravnog odbora Instituta za Tehnologiju Nuklearnih i Mineralnih Sirovina – ITNMS. U IKL-u (Industrija kotrljajućih ležaja) je od 1995-2000. godine bio predsednik upravnog odbora, a od 2003-2006. – njegov punopravni član.

Autor je i koautor više od dvadeset udžbenika, zbirki zadataka i priručnika, nekoliko monografije i tehničkih rešenja. Autor je dva realizovana i priznata patenta. Objavio je preko 150 radova u međunarodnim i domaćim časopisima i zbornicima sa naučnih i stručnih skupova.

Dobitnik je Nagrade Privredne komore Beograda za magistarski rad i doktorsku disertaciju (1988. i 1992. godine) i Zlatne medalje Nikola Tesla, Saveza pronalazača i tehničkih unapređenja Beograda (2016. godine).

Od 1995. godine je predsednik Skupštine košarkaškog kluba OKK Beograd.

Oženjen je, otac dva sina.

Biography and References:
http://omk.mas.bg.ac.rs/index.php/zaposleni/4-prof-dr-radivoje-mitrovic-redovni-profesor

CVs of a number of researchers of Team of Prohect ON174001 participants of research results

CV Julijana Simonović

Julijana Simonović (was born on 1975 in Sarajevo, Bosnia),

Assistant Professor, Faculty of Mechanical Engineering, University of Nis, Serbia.

Julijana takes a part as a researcher in the several research projects, which are coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA) and Faculty of Mechanical Engineering, University of Nis, starting from 2002, Project leader: Prof. Katica (Stevanović) Hedrih. She is a member of the Serbian Society of Mechanics, Organ-on-a-Chip Technologies Network (https://www.organonachip.org.uk/) and **Cardiff Institute for Tissue Engineering and Repair** (CITER), She has been registered as a STEM ambassador in UK.

She has been a doctor of science since 2012 with a thesis in the field of theoretical and applied mechanics on subject of Dynamics and Stability of Dynamics Hybrid Systems. During her postgraduate and doctoral studies, in the period from 2001 to 2012 year, she was mentored by Prof. Katica (Stevanović) Hedrih at the Faculty of Mechanical Engineering, University of Nis. In the same period she gave the contribution in the preparation and carrying out the practice and responsibility in teaching courses: Elastodynamics, Theory of Oscillation, Kinematics, Dynamics, Statics and Strengths of Materials as a teaching assistant and assistant professor. She was studying undergraduate program on the Department of Hydro energetics at the same faculty and graduated in 2000 with the overall grade 9.38 (out of 10).

She is experienced researcher in the field of nonlinear dynamics of the continuous and discrete as well as complex systems. Her contribution to the field is recognized as an author, co-author, with more than twenty publications, and reviewer in the scientific journals from the filed, such are Nonlinear Dynamics, International Journal of Bifurcation and Chaos, International Journal of Non-linear mechanics, Differntial Equations and Dynamical Systems and many others. She was participant and contributor to more than thirty scientific international conferences and congresses, among others to the well recognized International Congress of Theoretical and Applied Mechanics (ICTAM) and various European conferences of Mechanics (ENOC, EUROMECH, ECCOMAS, IConSSM, NODYCON and many others). She had series of lectures on seminar sessions and organization of mini-symposium at Mathematical Institute of Serbian Academy of Science and Arts.

She participated as one of the thirty early-stage researchers selected by Marie Skldowska Curie Action (MSCA) at the SICON (Stability, Identification and COntrol in Nonlinear structural dynamics) coherent series of courses and a concluding conference with specific training value for a several times in period 2007-2009.

She had two post-PhD study research periods (2014-2015 and 2017-2019). The first one was six-month research on subject Bone Tissue Advanced Modeling with Piezoelectricity at Interdisciplinary Centre for Mathematical and Computational Modelling of Warsaw University, Poland, supported by the Erasmus Mundus Action 2 Project Sigma Agile. The second was two-year-research period as an Individual Fellow at Biomedical Engineering Department, School of Engineering, Cardiff University, UK on the subject of Mathematical modeling of externally excited bone remodeling that has received funding from the *European Union's* H2020 MGA MSCA-IF-2016 under grant agreement No. 752793. In these periods, she has built and strengthened her interdisciplinary and international collaboration.

She also has highly developed public engagement skills, which have been boosted and enhanced through her participation in the photography Chinese Whisper project and Tea with a Researcher session for European Researcher`s Night in Bristol, 28th Sept. 2018, as well as through her attendance and contribution to the coaching session; “Communication and public speaking”, organized by the European Commission within the event “MSCA Satellite event ESOF 2018” in Toulouse, 6-8. Jul 2018.

Altogether, Dr Simonović has broad and well-established interdisciplinary and international researching and lecturing experience in Theoretical and Applied Mechanics, Biomechanics and Mechanobiology of bone tissue with the educated techniques to communicate her research also to the non-scientific public.

CV Dragutin Lj. Debeljkovic

Dragutin Lj. Debeljkovic was born in Belgrade (Yugoslavia) on 30 December 1950. He received three degrees from the University of Belgrade a B.S. in Thermo-energetic Engineering, (1974) an M. Sc. (1977) and Ph.D., (1979) both in Control and System Science Engineering.

From 1980 to 1989 he was a Assistant Professor at the University of Belgrade, Faculty of Mechanical Engineering, Department of Control Engineering. He became an Associate Professor in 1990 and a Professor in 1994 at the same school. By the end of 2002 he was elected for the member of Serbian Scientific Society.

He published: Two international monographs, Four chapters in an international monograph, 76 national scientific monographs, 29 papers in a leading international journals (SCI list), 51 papers in international journals, 180 papers published in proceedings and presented at the international meetings, conferences and symposiums, 110 papers published in leading national journals, 95 papers published in proceedings and presented at the national

The total number of citations of Prof. Debeljkovic papers s is 231 (Scopus). The total number of citations of Prof. Debeljkovic papers's according Google search is 1860, h - index: 19, g - index: 23, hc – index 8, hI – norm 9 i10 – index 52. The total number of citations of Prof. Debeljkovic papers's according Belgrade University Library is 146. His joint paper with Prof. Owens, is the most frequently mentioned (81 Scopus).

Prof. Debeljkovic served as the reviewer of respectable journals such as IEEE Transactions on Automatic Control, Automatica, System and Control Letters, IEE Proc., International Journal of System Science, Journal of Stochastic Analysis and Applications, AMSE journal and IFAC World Congress 2008, etc.

He was a supervisor of more than 390 diploma works, 45 (fortyfive) M. Sc. thesis and 15 (fifthteen) Ph. D. dissertations. He participated (20) and leaded (3) a number of developmental, fundamental, technological and innovation research projects in and for Serbian Technology Ministry as well for the industry.

Prof. D. Lj. Debeljkovic, also, participated a numerous *international projects* and Academic links, primarily throughout The British Council in Belgrade or Serbian Office for International Collaboration. In that sense he was connected with the University of Strathclyde (1985 – 1989), University of Exeter (1992 – 1996), City University of Hong Kong (1995, 2001) and The University of Hong Kong (2001), The Norteastern University of Shenyang – China (2002, 2004).
He was awarded: FULBRIGHT Scholarship (Rutgers University, USA) in 1991 and five time DAAD Scholarship.

Since 2004. prof. Debeljkovic is a Europe regional and associate editor of International Journal of Information and System Science (Canada) and is A. M. S. E. *representative editor* for the Serbia. From 2 nd February 2015 he is the member of Editorial Board for online submissions for international journal ACTA MATHEMATICA VIETNAMICA – Vietnam.

He kept several invited and tutorial lectures, among then one was held at IEEE Princeton Section on Circuits and Systems in (1991) and the other ones at the University of Exeter (1994), City University of Hong Kong (1995) and The University of Hong Kong (2001) and Institute of Chinese Academy of Science and Northeastern University of Shenyang (2002, 2004) in China. By the end of 2009, as a member of Commission he took part in election procedure for prof. Dr Sarah Koskie at Perdue School of Engineering and Technology, USA

CV Dragomir Zeković

Prof. Dr. – Eng. Dragomir Zeković was born in 1952 in Sivac, Vojvodina, Serbia. He completed elementary school in Sivac, and technical school in Kula in 1970. Prof. Zeković graduated from the Faculty of Mechanical Engineering, University of Belgrade in 1975, where he also received his MSc degree in 1978 and PhD degree in 1984 at the Chair of Mechanics. So far, he has published 41 scientific and professional papers, of which 5 were cited in 4 monographs (two in English and two in Russian). A certain number of papers were cited in the works by other authors. Prof. Zeković co-authored one textbook

CV NATAŠA R. TRIŠOVIĆ

NATAŠA R. TRIŠOVIĆ (born on July 1st, 1963 in Ivanjica, Serbia) is a Full Professor at the Faculty of Mechanical Engineering, Department of Mechanics, University of Belgrade in Serbia.

She graduated in 1987 from the Faculty of Mechanical Engineering at the University of Belgrade. She received the M.Sc. degree in 1995 and Ph.D. in 2007. Since 1989, she has advanced from a teaching assistant position to full professor while teaching a number of undergraduate and graduate courses at the Department of Mechanics.

Since 2011, Nataša Trišović takes part in the research projects lead by Prof. Katica (Stevanović) Hedrih and coordinated by the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA). Furthermore, she participated in more than 10 projects supported by the Ministry of Science of the Republic of Serbia. For her innovative contributions, Prof. Trišović and three co-authors received the first award from the assembly of Belgrade Municipality in 2005.

She initiated and designed a joint project for the Serbian-Chinese science and technology cooperation, which lasted for two years from 2013 to 2015. As Principal Investigator, she led the research on Nonlinear Stochastic Dynamics: Analytic solutions and Monte Carlo simulations. In addition, she participated as a researcher in the following Serbian-Chinese science and technology cooperation in 2015-2017 on the research of Fatigue estimation in the probability of a stochastic dynamical system under random loads. Prof. Trišović was a guest professor within the framework of Central European Exchange Program for University Studies (CEEPUS) at: Technical University, Liberec, Mechanical Engineering Faculty, Liberec, Czech Republic (2009), University of Banja Luka, Mechanical Engineering Faculty, Bosnia and Herzegovina (2010), (2012), Slovak Technological University, Mechanical Engineering Faculty, Bratislava, Slovak Republic (2010), Slovak Technological University of Electrical Engineering and Information Technologies, Bratislava, Slovak Republic (2010). Also, she was a guest professor at Rice University, Houston, USA, in summer of 2012, 2013 and 2014. She participated in the EUREKA Program E!4930: “Advanced Wavelet Analysis for Structural Testing – AWAST” from 1.07.2009 to 30.06.2011 and the ESPRIT project "Enhancing Industrial Safety, Environmental Protection and Risk Management in Serbia by Means of Dedicated Training, Education and Technology Transfer“, from 2009 to 2010 organized by "Steinbeis University", Stuttgart. During this time, she attended the courses: Occupational Safety and Health, Introduction to Safety and Risk Analysis in Industry, Risk-Based Inspection –Petro, Reliability Centered Maintenance and Root Cause Failure Analysis, Fire Protection and Modeling, Transport of Dangerous Materials, Accident and Consequences Modeling. She received the Certificate "Senior Risk Assessor, Equipment Track".

From 1998 to 2017, she coauthored the following books: Handbook of Mechanics - Dynamics, Handbook of Mechanics - Statics and Kinematics, Engineering Mechanics, Statics – solved problems and Dynamics. All titles are published by the Faculty of Mechanical Engineering at the University of Belgrade.

She is a member of European Structural Integrity Society (ESIS), member of Serbian Structural Integrity and Life Society (DIVK), member and secretary of Serbian Society of Mechanics, co-founder and co-chairman of SMMM (Symposium of Mechanics, Mechatronics and Machines). In the scope of Scientific Research, Prof. Trišović published more than 10 papers in ISI Journals and more than 60 papers at International Conferences, covering Theoretical and Applied Mechanics, Fatigue, Numerical Methods (FEM) and Vibrations.

https://www.mas.bg.ac.rs/fakultet/nastavnici/211

CV Ljubinko B. Kevac

Ljubinko B. Kevac was born on 26.05.1987. in Kljuc, Bosnia and Herzegovina. He started Elementary school in Kljuc, but he has finished it in Bijeljina. In Bijeljina he has finished Engineering High School as well. During schooling, he was a part of several scientific competitions. In 2006, he enrolled at School of Electrical Engineering, University of Belgrade. He finished bachelor studies in 2010 with average mark of 8.68 and with highest mark on bachelor thesis. Afterwards, he started master studies at the same School. One year after, he finished master studies with average mark of 9.67 and highest mark on master thesis. Same year, he started collaboration with colleagues from Mihajlo Pupin Institute and with his co-mentor Dr Mirjana Filipovic at Institute’s Robotics laboratory. He enrolled on PhD studies at School of Electrical Engineering, University of Belgrade at the beginning of 2012. At the beginning of April in 2012 he started working at Innovation centre of School of Electrical Engineering in Belgrade.

Dr Ljubinko’s scientific area of are: analysis, synthesis and mathematical modelling of Cable – suspended parallel robots – CPR systems. He has published more than 30 papers in scientific journals and robotics and control system conferences.

He is a reviewer for several journals and international conferences such are journal Robotica and international robotics conference RAAD.

He was a part of National project named: „Dynamics of the hybrid systems with complex structures. Mechanics of materials.“, OI-174001, which project lead is Prof. Dr Katica S. Hedrih.

and referred four monographs.

CV Radoslav Radulović

Radoslav Radulović was born on May 24, 1986 in Peć. On completing elementary and secondary school in Belgrade, he enrolled in the Faculty of Mechanical Engineering, University of Belgrade. He completed BSc undergraduate studies, module of Aerospace Engineering, in average grade 10.00. Being one of the best students, Radoslav Radulović received an honorable mention for excellence in undergraduate study on the Day of Mechanical Engineering Faculty celebrations. He received scholarships from Serbia's Fund for Young Talents 'Dositeja' and Serbia's Fund for Young Talents. In 2011 he enrolled in doctoral studies at the Faculty of Mechanical Engineering, University of Belgrade and passed all obligatory exams in excellent grades (average 10.00): Advanced course in mathematics, Numerical methods and OMNIRiK, as well as elective courses: Selected chapters in mechanics, Analytical mechanics, Stability of system motion, Dynamics of rigid body systems, Continuum mechanics, Mechanics of nonholonomic systems. Doctoral candidate Radoslav Radulović has also passed with excellence six supplementary postgraduate taught subjects at the Chair of Mechanics: Tensor calculus, Epistemology of science and engineering, Oscillations of mechanical systems (linear and nonlinear), Control of mechanical system motion, Mechanics of a variable-mass system, Mechanics of impact. At the international congress of Serbian Society of Mechanics, held in Vrnjačka Banja 4 – 7 June, 2013, Radoslav Radulović received a prestigious award 'Rastko Stojanović' given to young researchers for their independent publication and presentation of a scientific paper. He defended doctoral dissertation under the title "**GLOBAL MINIMUM TIME FOR THE MOTION OF MECHANICAL SYSTEMS WITH LIMITED CONTROLS AND CONSTRAINT REACTIONS**".

http://www.mi.sanu.ac.rs/novi_sajt/research/projects/174001a.php

https://kobson.nb.rs/nauka_u_srbiji.132.html?autor=Radulovic%20Radoslav%20D&samoar=#.XFlldtKiUk